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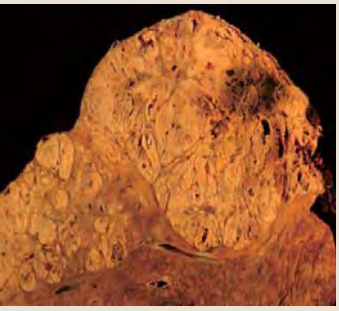

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Viral Hepatitis A, Active Component, U.S. Armed Forces, 2000-2010

From 2000 to 2010, there were 214 incident diagnoses of acute hepatitis A among active component members of the U.S. Armed Forces; the crude overall incidence rate during the period was 1.37 per 100,000 person-years. Rates of incident diagnoses of acute hepatitis A were relatively low throughout the period and much lower than during the pre-vaccine era (1990-1996). There were disproportionate numbers of diagnoses of acute hepatitis A among service members born in countries endemic for the infection. The low rates of acute hepatitis A among U.S. military members overall reflect the widespread use of hepatitis A virus vaccine.

Hepatitis A virus (HAV) causes inflammatory liver disease (hepatitis) in affected individuals. The virus is spread through fecal-oral transmission, often through contaminated food, drink, or objects handled by infected persons. HAV infections range from an asymptomatic or mild illness to a severe illness that lasts for months. HAV infections do not cause chronic hepatitis. Recovery from HAV infection is associated with lifelong immunity against a repeat infection.

Hepatitis A has a long history as a militarily important disease. Epidemics of hepatitis A due to contaminated food or water, and propagated by unsanitary food and water handling practices, have threatened many wartime operations, particularly in highly endemic areas and during unstable (e.g., rapidly changing) field conditions.[1] In response, U.S. military medical researchers and their civilian collaborators developed, tested, and facilitated widespread distribution of an HAV vaccine.[1]

In 1995 the Department of Defense mandated screening and hepatitis A immunization of immunologically naïve individuals entering the military and for service members assigned or deployed to geographic areas of high endemicity.[2] Since then, there has been a dramatic decline in hepatitis A hospitalizations among service members.[3] Hepatitis A incidence has also decreased in the U.S. general population – particularly after 1999, when routine vaccinations were expanded from children at the highest risk to a wider population of high-risk individuals.[4,5] This report estimates the frequencies, incidence rates, trends, and correlates of risk of hepatitis A from 2000-2010 among active component military personnel.

METHODS

The surveillance period was 1 January 2000 to 31 December 2010. The surveillance population included members of the active components of the Army, Navy, Air Force, Marine Corps, and Coast Guard. Incident cases were identified by searching for diagnoses of hepatitis A (ICD-9-CM: 070.0, 070.1) reported during medical encounters in U.S. military medical facilities or with purchased care providers. A case was defined by a notifiable medical event report of a confirmed case of hepatitis A, a single inpatient diagnosis of hepatitis A, or two outpatient encounters not more than 14 days apart with hepatitis A diagnoses in any diagnostic position. For each case, the date of onset was considered the date of the earliest notifiable medical event report, inpatient encounter, or outpatient encounter (in that priority) that was contributory to the definition of an hepatitis A case; each individual was considered an incident case only once during the surveillance period. An encounter was excluded if there was evidence of an HAV immunization within one week before or after the case-defining encounter; a case was excluded if the affected individual had an hepatitis A encounter prior to the surveillance period.

The country of birth of each case was considered that reported at the time of application to service. CDC travel guidelines were used to characterize some countries as "high endemicity" for hepatitis A.[7] Immunization records were reviewed to identify previous HAV vaccinations.

RESULTS

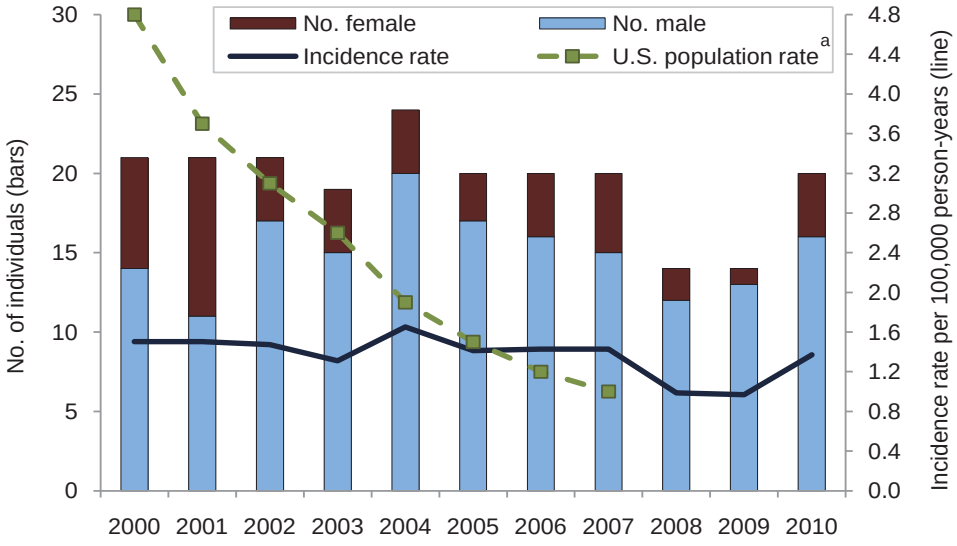
During the 11-year surveillance period, there were 214 incident cases of hepatitis A. The overall incidence rate was 1.37 per 100,000 person-years (p-yrs) **(Table 1)**. Annual rates were relatively steady from 2000 to 2007 (range: 1.31 and 1.65 per 100,000 p-yrs in 2003 and 2004, respectively), lower in 2008 and 2009 (0.99 and 0.97 per 100,000 p-yrs, respectively); and

TABLE 1. Acute hepatitis A, active component, U.S. Armed Forces, 2000-2010

	No.	Rate[a]	IRR[b]
Total	**214**	**1.37**	**.**
Sex			
Female	48	2.11	1.70
Male	166	1.24	Ref
Age Group			
17-19	20	1.32	1.08
20-29	120	1.41	1.15
30-39	51	1.22	Ref
40+	23	1.62	1.33
Race-ethnicity			
White, non-Hispanic	121	1.22	1.13
Black, non-Hispanic	51	1.85	1.71
Hispanic	17	1.08	Ref
Asian/Pacific Islander	17	2.40	2.22
Other	5	1.08	0.99
American Indian/ Alaskan Native	3	1.17	1.08
Service			
Army	97	1.75	2.19
Navy	31	0.80	Ref
Air Force	63	1.65	2.06
Marine Corps	18	0.90	1.12
Coast Guard	5	1.17	1.46
Military Occupation			
Health care	18	1.40	1.12
Combat-specific	40	1.25	Ref
Other	156	1.39	1.11

[a]Rate per 100,000 person-years
[b]Incidence Rate Ratio

FIGURE 1. Incident cases and incidence rates of acute hepatitis A, by gender, active component, U.S. Armed Forces, 2000-2010



[a]Incidence rate per 100,000 population[7]

then similar in 2010 to the first eight years of the period (1.37 per 100,000 p-yrs) **(Figure 1)**. Thirty-five percent of cases were hospitalized (n=74, incidence rate= 0.47 per 100,000 p-yrs).

The crude overall incidence rate was higher among females (2.11 per 100,000 p-yrs) than males (1.24 per 100,000 p-yrs) and among service members older than 40 years (1.62 per 100,000 p-yrs) than in any other age group **(Table 1)**. Asian/Pacific Islander and black, non-Hispanic service members had higher hepatitis A incidence rates (2.40 and 1.85 per 100,000 p-yrs, respectively) than any other racial/ethnic groups (which had similar rates). Rates were higher in the Army and Air Force (1.75 and 1.65 per 100,000 p-yrs, respectively) than the other Services and were similar across occupational categories **(Table 1)**.

Approximately three-fourths of cases (n=165; 77%) had their countries of birth documented on routinely available records. Of these cases, most (84%) were born in the United States; approximately twelve percent were born in countries with high hepatitis A endemicity[6] (compared to the overall military population: 94% born in the U.S. and 3% born in hepatitis A endemic countries) **(data not shown)**.

Of the 214 HAV infections, five percent had at least one hepatitis A-related symptom (e.g., nausea, vomiting, abdominal pain) reported at the time of their incident diagnosis. In regard to prior HAV vaccinations on record, 34 cases (16%) had none, 37 cases (17%) had one, and 143 cases (67%) had two or more **(Figure 2)**.

EDITORIAL COMMENT

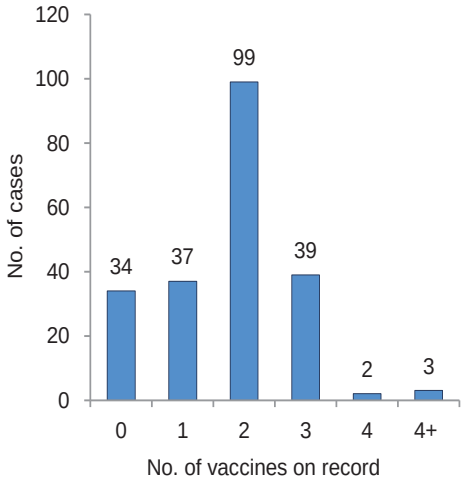
This report documents relatively low and stable rates of hepatitis A in the U.S. military over the past 11 years. Each year during the period, approximately 20 service members (average) were diagnosed with hepatitis A; of these, approximately seven were hospitalized. The hospitalization rate of 0.47 per 100,000 person years during the surveillance period contrasts sharply with the immediate pre-vaccine era (1990-1996), when the rates of hospitalizations alone for hepatitis A in the Armed Forces ranged from a low of approximately 1.6 per 100,000 p-yrs in 1990 to a peak of about 3.3 per 100,000 p-yrs in 1991.[3]

From 2000 to 2007, crude rates of hepatitis A decreased in the general U.S. population; and from 2005-2007, crude rates were similar in U.S. military and civilian populations **(Figure 1)**.[5] However, for several reasons, direct comparisons of rates between U.S. military members and U.S. civilians are potentially misleading and should be interpreted carefully. For example, the analysis reported here estimated HAV infection incidence rates by dividing the number of incident HAV infections ("first diagnosis per person") by the total years of military service by active component members ("cumulative person-time exposed to risk"). In contrast, rates in the general U.S. population are estimated as incident cases per 100,000 individuals. The general population of the U.S. includes individuals of all ages; in turn, rates in the general (but not military) population reflect recent steep declines in hepatitis A rates among infants and children as well as low rates among the sizable civilian population that is over the age of 40.

It should be noted that the incidence rate among female service members (2.11 cases per 100,000 p-yrs) was 1.7 times that of males (1.24 per 100,000 p-yrs). This finding contrasts with the U.S. civilian population in whom male rates of hepatitis A are consistently higher than those of females and in all age groups. The analysis in this report cannot explain this observation but it is conceivable that military service may expose women to greater risks of exposure to HAV but may also afford readier access to health care in which the diagnosis can be confirmed.

In both U.S. military and civilian populations, consistently low (or declining) incidence rates of HAV undoubtedly

FIGURE 2. Number of hepatitis A acute cases by number of HAV vaccines on record for each case, active component, U.S. Armed Forces



reflect relatively recent widespread uses of HAV vaccine. For example, in this report, rates were higher among the oldest than any other age group of service members. It is likely that many service members older than 40 years during the period of this report entered military service before the HAV vaccination program began in 1995, and they remained immunologically susceptible throughout their service careers.

In addition, hepatitis A incidence rates among 20-29 year old service members decreased 40 percent during the surveillance period; the finding likely reflects, at least in part, increasing prevalences of childhood vaccination against hepatitis A among recent accessions to the military **(data not shown)**.

Also, more than two-thirds of the incident cases included in this analysis had two or more HAV vaccinations on record. The HAV vaccines in current use are highly effective; however, two to four doses are required to achieve maximum protective efficacy.[7] Thus, despite routine and widespread vaccination, because some individuals remain susceptible to infection risk after two or three doses, at any given time, at least some service members will be immunologically susceptible to HAV infection. For this reason (and to counter threats from other food, water, and fecal-orally transmitted pathogens), field sanitation and hygiene preventive measures – particularly hand washing after using latrines and before/after handling food – should be stressed.

In summary, over the past 11 years, numbers and rates of hepatitis A diagnoses among U.S. military members have been consistently low. The finding is particularly noteworthy in light of the U.S. military's continuous engagement over the past ten years in a hyper-endemic region for hepatitis A. The experience reported here is undoubtedly attributable to widespread vaccination in U.S. military and civilian populations; as such, the experience serves as a tribute to the U.S. military medical researchers and their civilian collaborators who developed the vaccine.

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Viral Hepatitis B, Active Component, U.S. Armed Forces, 2000-2010

From 2000 to 2010, there were 903 and 1,484 incident diagnoses of acute and chronic hepatitis B virus infections, respectively, among active component members of the U.S. Armed Forces; crude overall incidence rates during the period were 5.8 (acute hepatitis B) and 9.5 (chronic hepatitis B) per 100,000 person-years. Incidence rates of both acute and chronic hepatitis B declined during the period. There were relatively high crude rates of hepatitis B diagnoses among service members who were Asian/Pacific Islanders, females, health care workers, and older than 40 years. Declining rates of hepatitis B diagnoses in the U.S. military likely reflect increased avoidance of risky behaviors, vaccination of immunologically naive recruits, and accession into service of increasing numbers of individuals immunized during childhood.

Hepatitis B virus (HBV) causes an inflammatory liver disease (hepatitis B) in affected individuals. The virus is spread by percutaneous or mucous membrane exposure to infected blood or body fluids. Risk factors include high-risk sexual activity (e.g., unprotected sex, multiple partners), illegal injection drug use, and birth to an infected mother.

Most adults who become infected with HBV develop acute hepatitis B and then recover completely; these individuals have serologic evidence of past infection but no other sequelae. A small proportion of those infected with HBV become chronically infected with the virus; of these individuals, most are asymptomatic "carriers." Carriers of HBV have no persistent liver inflammation or dysfunction; however, because they are chronically infected with the virus, they are capable of transmitting it to others. Finally, a relatively small proportion of those who are infected with HBV develop chronic active hepatitis with persistent liver inflammation, tissue damage, and dysfunction. Chronic active hepatitis due to HBV can have serious long term effects, including cirrhosis and hepatocellular carcinoma; treatment of chronic HBV hepatitis is indicated to prevent such life threatening clinical sequelae.[1]

HBV is a militarily relevant infection because it degrades the health and military operational capabilities of those affected and demands significant health care resources for its clinical management. In recent years, rates of newly acquired HBV infections in the general U.S. population have declined; the trend reflects increased awareness and avoidance of risky behaviors (which are shared with other infections including HIV) and vaccination of children and high-risk individuals.[2]

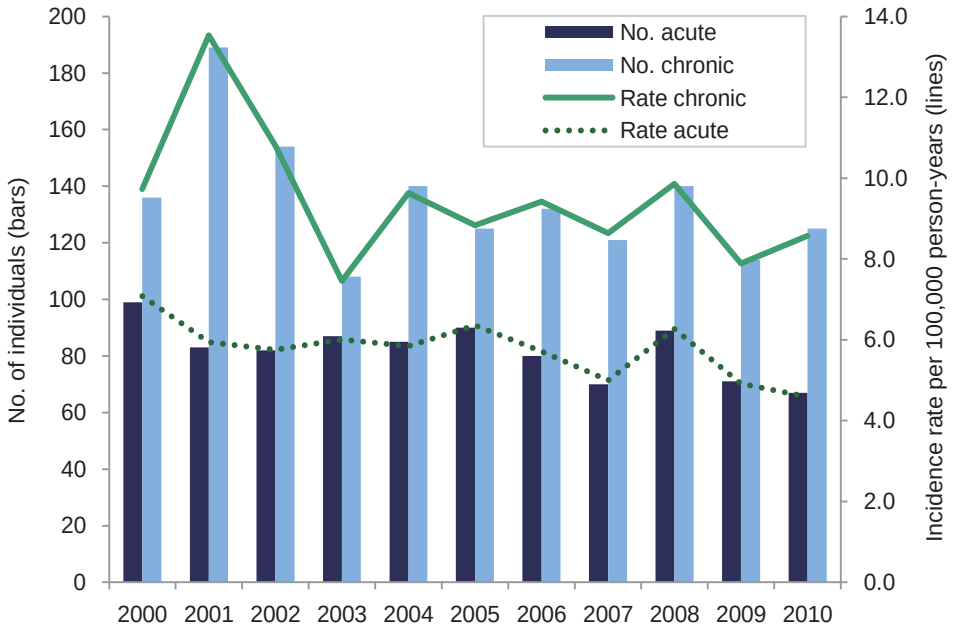
In the U.S. military, potential applicants are considered medically ineligible for service if they have current acute or chronic hepatitis, hepatitis carrier state, clinically apparent hepatitis within the preceding six months, persistent symptoms of hepatitis, or evidence of liver function

TABLE 1. Acute and chronic hepatitis B, active component, U.S. Armed Forces, 2000-2010

	Acute hepatitis B			Chronic hepatitis B		
	No.	Rate[a]	IRR[b]	No.	Rate[a]	IRR[b]
Total	**903**	**5.8**	**.**	**1,484**	**9.5**	**.**
Sex						
Female	193	8.5	1.60	408	18.0	2.23
Male	710	5.3	Ref	1,076	8.0	Ref
Service						
Army	373	6.7	2.06	521	9.4	1.75
Navy	263	6.8	2.08	516	13.3	2.48
Air Force	167	4.4	1.34	296	7.8	1.45
Marine Corps	86	4.3	1.31	128	6.4	1.19
Coast Guard	14	3.3	Ref	23	5.4	Ref
Age Group						
17-19	64	4.2	Ref	107	7.0	Ref
20-29	452	5.3	1.26	701	8.2	1.17
30-39	251	6.0	1.42	438	10.5	1.48
40+	136	9.6	2.28	238	16.8	2.39
Race-ethnicity						
White, non-Hispanic	249	2.5	Ref	266	2.7	Ref
Black, non-Hispanic	291	10.5	4.20	463	16.8	6.25
Hispanic	67	4.3	1.70	70	4.5	1.66
Asian/Pacific Islander	256	36.2	14.41	601	85.0	31.67
American Indian/Alaskan Native	8	3.1	1.24	10	3.9	1.46
Other	32	6.9	2.74	74	15.9	5.93
Military Occupation						
Health care	96	7.5	2.21	238	18.5	3.99
Combat-specific	108	3.4	Ref	148	4.6	Ref
Other	699	6.2	1.84	1,098	9.8	2.11

[a]Rate per 100,000 person-years
[b]Incidence Rate Ratio

FIGURE 1. Incident cases and incidence rates of acute and chronic hepatitis B, active component, U.S. Armed Forces, 2000-2010



impairment.[3] Because applicants to military service are not screened for HBV infection, HBV infected individuals may be able to enter service if they have no signs or symptoms of liver disease, or if they are unaware of, or do not report their infection statuses.

In 2002, the Assistant Secretary of Defense for Health Affairs mandated HBV vaccination of military recruits.[3] In November 2005, the Army Surgeon General implemented protocols to screen recruits for antibodies to HBV and vaccinate those who are not immune.[4]

This report estimates frequencies, incidence rates, trends, and correlates of risk of acute and chronic HBV infections among active component U.S. military members from 2000-2010.

METHODS

The surveillance period was 1 January 2000 to 31 December 2010. The surveillance population included all individuals who served in the active components of the Army, Navy, Air Force, Marine Corps, or Coast Guard any time during the surveillance period. Individuals were excluded from the analysis if they had an HBV-related medical encounter prior to the surveillance period.

Incident cases were identified by searching for diagnoses of acute hepatitis B (ICD-9-CM: 070.20. 070.21, 070.30, 070.31) and chronic hepatitis B (ICD-9-CM: 070.22, 070.23, 070.32, 070.33, V02.61) reported during medical encounters in U.S. military medical facilities or with purchased care providers. An acute or chronic case was defined as an individual with a confirmed reportable medical event of hepatitis B; a single inpatient diagnosis (in any diagnostic position) of acute or chronic hepatitis B; or two diagnoses (in any diagnostic position) of acute hepatitis B or chronic hepatitis B during outpatient encounters not more than 90 days apart. The date of onset of each case was considered the date of the earliest reportable medical event, inpatient encounter, or outpatient encounter (in that priority) that contributed to defining the case. Each individual could be considered an incident case of acute and chronic hepatitis only once each during the surveillance period. For surveillance purposes, individuals who were ascertained as acute cases were considered incident chronic cases after a single subsequent outpatient diagnosis of chronic hepatitis B.

Encounters were excluded from the analysis if there was evidence of an HBV immunization within one week before or after the encounter. All diagnoses of acute hepatitis B that followed any diagnosis of chronic hepatitis B were excluded from consideration as case defining of acute hepatitis B. If an individual received diagnoses of acute and chronic hepatitis B on the same day, all encounters on that day were considered chronic hepatitis B-related.

The country of birth of each case was considered that reported at the time of application to military service. CDC travel guidelines were used to characterize some countries as "high endemicity" for hepatitis B.[5] HBV vaccinations of service

FIGURE 2. Incident cases and incidence rates of acute and chronic hepatitis B, by age group, active component, U.S. Armed Forces, 2000-2010

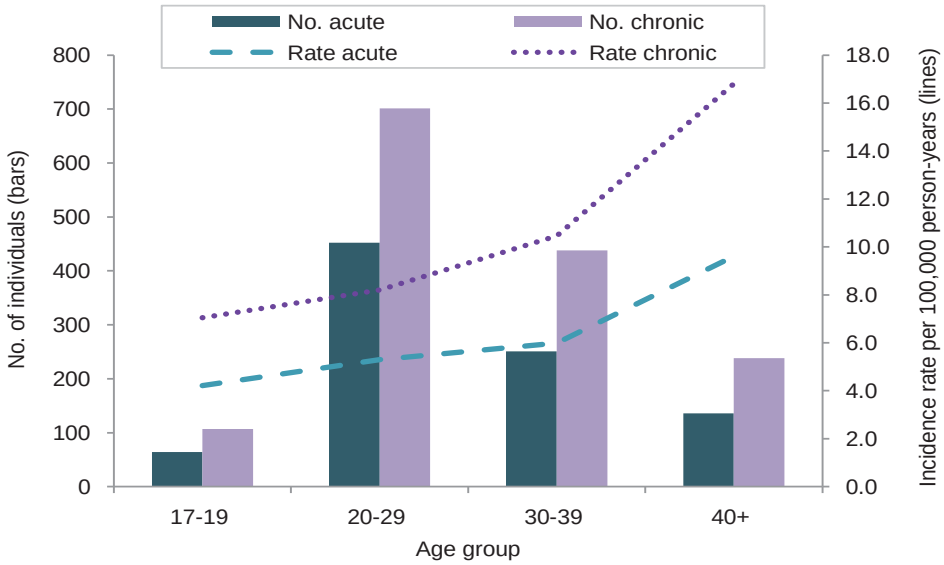


FIGURE 3A. Incidence rates of acute hepatitis B, by race/ethnicity, active component, U.S. Armed Forces, 2000-2010

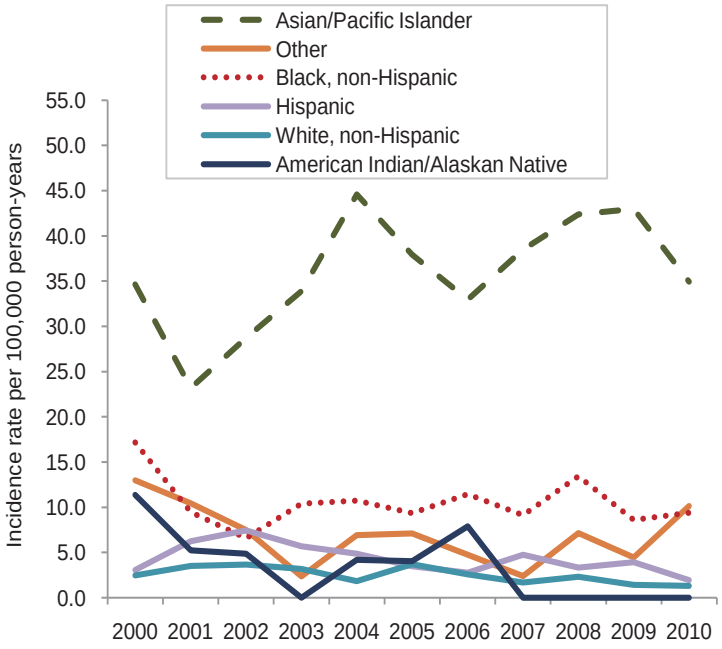
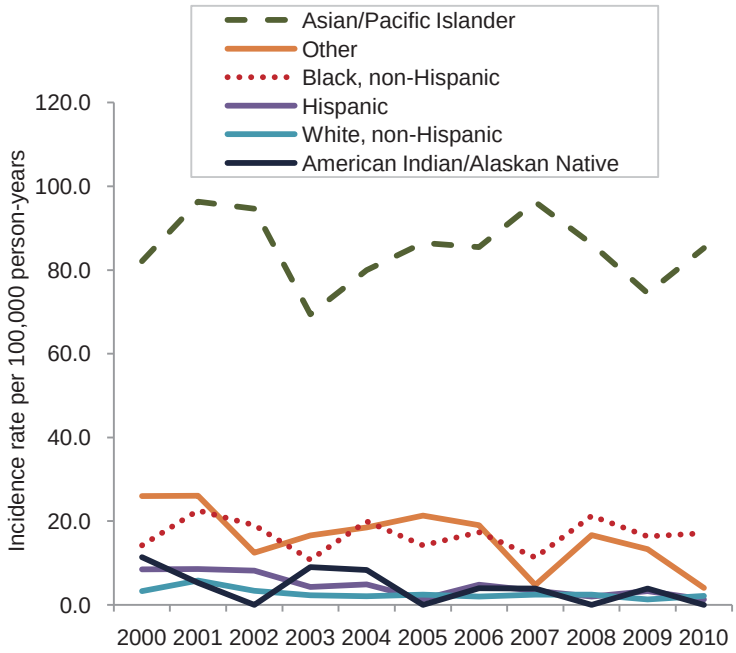


FIGURE 3B. Incidence rates of chronic hepatitis B by race/ethnicity, active component, U.S. Armed Forces, 2000-2010



members were ascertained from records of immunizations while in U.S. military service.

All data used for the analysis were derived from records routinely maintained in the Defense Medical Surveillance System (DMSS) for health surveillance purposes.

RESULTS

During the 11-year surveillance period, there were 903 and 1,484 incident diagnoses of acute and chronic hepatitis B, respectively. Overall incidence rates of diagnoses of acute and chronic hepatitis B were 5.8 and 9.5 per 100,000 person-years (p-yrs), respectively **(Table 1)**.

Rates of diagnoses of acute hepatitis B generally declined during the period. The highest and lowest annual rates were in 2000 (7.1 per 100,000 p-yrs) and 2010 (4.6 per 100,000 p-yrs), respectively **(Figure 1)**.

Rates of diagnoses of chronic hepatitis B also generally declined during the period. The highest annual rate was in 2001 (13.5 per 100,000 p-yrs) and the lowest in 2003 (7.5 per 100,000 p-yrs); from 2004 to 2010, annual rates were intermediate and fairly stable (9.6 and 8.6 per 100,000 p-yrs, in 2004 and 2010 respectively) **(Figure 1)**.

ACUTE HEPATITIS B

Over the period, the crude incidence rate of acute hepatitis B was higher among females (8.5 per 100,000 p-yrs) than males (5.3 per 100,000 p-yrs); those in health care (7.5 per 100,000 p-yrs) than other military occupational groups; and members of the Navy and Army (6.8 and 6.7 per 100,000 p-yrs, respectively) than the other Services **(Table 1)**. Incidence rates generally increased with age; the increase in rates was particularly large between those in their thirties (6.0 per 100,000 p-yrs) and those older than 40 (9.6 per 100,000 p-yrs) **(Table 1, Figure 2)**.

There was a 14.4-fold difference between the highest (Asian/Pacific Islander: 36.2 per 100,000 p-yrs) and lowest (white, non-Hispanic: 2.5 per 100,000 p-yrs) racial-ethnic-specific crude incidence rates of acute hepatitis B diagnoses **(Table 1)**. Rates were consistently much higher among Asian/Pacific Islanders than other racial-ethnic subgroup members; in addition, annual rates generally increased during the period among Asian/Pacific Islanders but were stable or declined in other racial-ethnic subgroups **(Figure 3a)**.

CHRONIC HEPATITIS B

During the period, in each demographic subgroup, there were more incident diagnoses of chronic than acute HBV infections. The crude overall incidence rate of chronic hepatitis B was higher among females (18.0 per 100,000 p-yrs) than males (8.0 per 100,000 p-yrs); those in health care (18.5 per 100,000 p-yrs) than other military occupational groups; and members of the Navy (13.3 per 100,000 p-yrs) than the other Services **(Table 1)**. As with acute hepatitis B, rates of diagnoses of chronic infection increased with age; and the increase in rates was particularly large between those in their thirties (10.5 per 100,000 p-yrs) and those older than 40 (16.8 per 100,000 p-yrs) **(Table 1, Figure 2)**.

Also, as with acute hepatitis B, there was more than a 30-fold difference between the highest (Asian/Pacific Islander: 85.0 per 100,000 p-yrs) and lowest (white, non-Hispanic: 2.7 per 100,000 p-yrs) racial-ethnic-specific incidence rates of chronic HBV diagnoses. During the period, annual rates among Asian/Pacific Islanders varied from year to year, were stable overall, and were consistently much higher than the rates in all other racial-ethnic subgroups **(Figure 3b)**.

Slightly more than one-half (54.6%) of all service members diagnosed with acute hepatitis B had subsequent diagnoses of chronic infection; of these cases, two-thirds (65%) were diagnosed with chronic hepatitis B within 6 months, and 79 percent

within one year, after first diagnoses with acute infection **(data not shown)**.

CLINICAL MANIFESTATIONS

Among acute and chronic cases of HBV infection, 5.3 and 4.8 percent, respectively, had at least one symptom reported at the time of their first HBV-related medical encounter. The most frequently reported symptoms during initial HBV-related encounters were "symptoms involving digestive system" (i.e., nausea, vomiting, diarrhea) **(data not shown)**.

During the period, approximately one of four acute cases (n=227; 25.1%) and one of five chronic cases (n=298; 20.1%) had at least one HBV-related hospitalization (i.e., HBV infection was included as a discharge diagnosis). Rates of hospitalized cases of both acute and chronic hepatitis B markedly decreased over the period (hospitalized hepatitis B cases, % change in rates, 2000 to 2010: acute, -44%; chronic, -12%) **(data not shown)**.

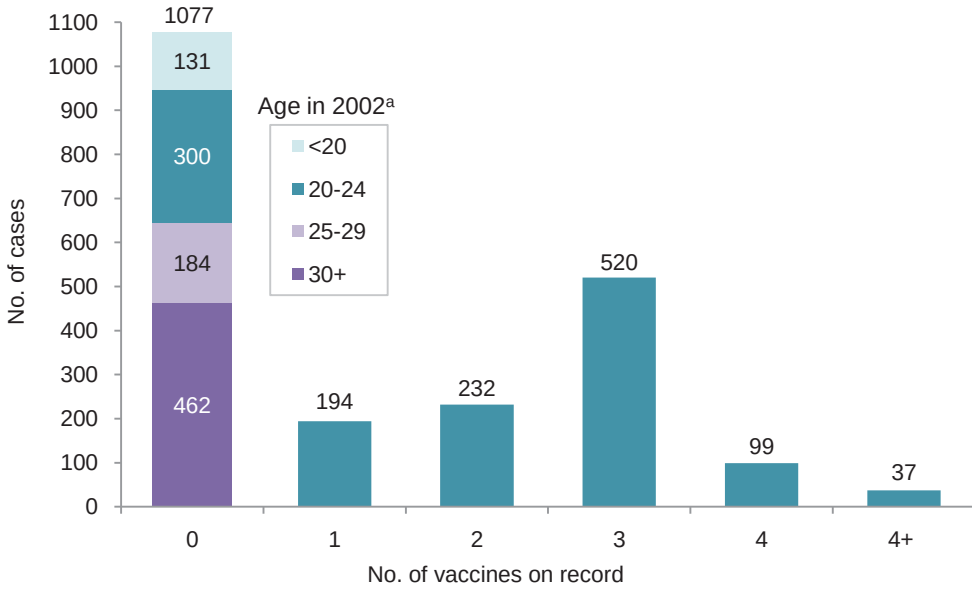
BIRTH COUNTRIES

Nearly three-fourths (n=1,581; 73.2%) of all cases (acute and chronic) had their countries of birth documented on routinely available records. Of cases with known birth countries, slightly more than one-half (53.1%) were born in the United States, and nearly all others (46.8%) were born in Asia or the Pacific Islands. Of the latter group, service members from the Philippines accounted for the most cases (10.2% of the total) **(data not shown)**. By comparison, for the entire active duty population, 94 percent were born in the U.S. and 2.1 percent were born in Asia or the Pacific Islands (1% born in the Philippines).

IMMUNIZATION STATUS

Of the 2,159 service members who were diagnosed with HBV infections during the period, 1,077 (49.9%) had no HBV immunizations on record prior to their infection diagnoses. Of the others, 426 (19.7% of the total) had 1 or 2 immunization doses and 656 (30.4% of the total) had 3 or more immunization doses on record prior to their HBV infection diagnoses **(Figure 4)**. Of cases who had received no HBV vaccinations prior to their infection diagnoses, 60 percent (n= 646) were at least 25 years old, and 20 percent (n=200) were 20-24 years old, in 2002 (the year that the recruit HBV vaccination program began) **(Figure 4)**.

FIGURE 4. Number of cases of hepatitis B by number of vaccines on record and age in 2002[a] for those receiving no vaccination, active component, U.S. Armed Forces, 2000-2010



[a]In 2002, the DoD mandated HBV vaccine in new recruits; those already in service in 2002 may not have received vaccination as part of this program

EDITORIAL COMMENT

Since calendar year 2000, rates of incident diagnoses of acute hepatitis B declined by approximately 25 percent among active component military members. The trend, which mirrors that in the general U.S. population, undoubtedly reflects increased awareness and avoidance of risky behaviors, vaccination of immunologically naïve recruits, and accession into service of increasing numbers of previously immunized individuals (as part of the U.S. childhood vaccination program which began in 1991).[6]

Throughout the period of this report, there were many more diagnoses of chronic than acute HBV infections; there are several reasons for the finding. For example, many chronically infected service members were likely infected with HBV before they entered active service; in addition, many HBV infections have insignificant or inapparent clinical manifestations. Because there is no screening for chronic HBV infection among applicants for service or at entry to service, some chronically infected applicants may have forgotten or may not disclose their acute infection experiences, and some accessions may be unaware of their chronic infection statuses.

In the past ten years, there were particularly high crude rates of diagnoses of acute and chronic hepatitis B among service members who were Asian/Pacific Islanders, females, health care workers, and older than 40 years.

Of all HBV infected service members with countries of birth documented on available records, nearly one-half were from Asia or Pacific Islands. HBV infection is hyperendemic in many Asian and western Pacific countries.[5] Since 2008, the Centers for Disease Control and Prevention (CDC) has recommended routine screening for hepatitis B surface antigen (HBsAg) of all persons who were born in geographic regions with HBsAg prevalences ≥2% (including all countries in Africa, Asia, and the South Pacific [except Australia and New Zealand]). Because applicants for and accessions to service are not screened for HBV infection, some HBV infected accessions from hyperendemic areas may not be

diagnosed with HBV infections until later in their service careers.

Higher rates of hepatitis B diagnoses among female than male military members reflects at least in part more complete ascertainment of asymptomatic HBV infections. For example, the U.S. Preventive Services Task Force recommends screening for HBV during the first prenatal visits of all pregnant women. Also, HBV screening is recommended for the sexual and household contacts of HBV infected persons.

Of note, most service members who were older than 40 years during the period of this report entered military service before the HBV vaccination program began in 2002. Thus, it is likely that many of the members of this cohort who were immunologically susceptible to HBV when they entered military service remained at risk of infection throughout, or were infected with HBV during, their service careers. Of those who were chronically infected with HBV when they entered service prior to 2002, many may not have been diagnosed with infection until much later in their service careers (e.g., pre-retirement medical examination). A relevant finding of this report was that nearly one-third of all service members diagnosed with hepatitis B during the surveillance period were at least 25 years old in 2002 and had no documented HBV vaccinations.

Finally, it is not surprising that rates of hepatitis B diagnoses are higher among military health care workers than other military members. For example, many health care workers are exposed to potentially infectious blood and other body fluids in the course of their duties (e.g., battlefield trauma care, surgical and invasive diagnostic procedures, phlebotomies, drug injections, wound care). Because of the inherent occupational risks, health care workers may be closely monitored for infections with blood borne pathogens; in turn, asymptomatic HBV infections (e.g., chronic HBV carriers) may be more completely detected among health care workers than other military members. Also, military health care workers are relatively older and more often female than members of other military occupational groups; and in general, rates of hepatitis B diagnoses are higher among older and female service members than their counterparts.

There are several limitations to this report that should be considered when interpreting these results. Of particular importance in this regard, diagnostic codes specific for "acute hepatitis B" may be inappropriately reported when individuals, for example, are screened for or immunized against HBV, have symptoms suggestive of acute hepatitis (e.g., "rule out" acute hepatitis B), have serologic test results indicative of past infections with HBV, and others. A review of laboratory tests that were conducted in relation to a sample of the acute hepatitis B cases reported here revealed that the results were more often consistent with chronic than acute HBV infections **(data not shown)**.

Also, this report summarized numbers, rates, and trends of incident diagnoses – not acquisitions – of HBV infections. Because dates of acquisition of HBV infections are not known, and because lags between dates of HBV acquisition and diagnoses can be long and highly variable, trends reported here are more reflective of the scope and intensity of detecting past HBV infections (e.g., screening for chronic asymptomatic carriers) than trends of HBV infection acquisitions by U.S. military members. As such, rising or falling trends of incident diagnoses may not be particularly informative regarding the effectiveness of HBV infection prevention efforts.

Finally, among U.S. adults, high-risk sexual behaviors are the most common routes of HBV transmission.[2] Sexually transmitted infections (STIs) occur at relatively high rates among U.S. military members, and STI rates may increase during periods of frequent deployments and high operational stresses (e.g., combat).[8] The results of this and other reports suggest that HBV screening and vaccination programs should continue, and STI prevention efforts should be reinforced.

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Viral Hepatitis C, active component, U.S. Armed Forces, 2000-2010

From 2000 to 2010, there were 808 and 2,738 incident cases of acute and chronic hepatitis C, respectively, among active component members of the U.S. Armed Forces; crude overall incidence rates during the period were 5.16 (acute hepatitis C) and 17.48 (chronic hepatitis C) per 100,000 person-years. Incidence rates of acute hepatitis C diagnoses steadily declined (by approximately 80% overall) during the period; rates of chronic hepatitis C diagnoses also declined but proportionately less overall than for acute hepatitis C. Declining trends likely reflect avoidance of risky behaviors, comprehensive screening of blood products, and accession standards that include screening for illicit drugs and antibodies to HIV-1.

Hepatitis C virus (HCV) can cause acute and chronic inflammation of the liver in affected individuals. The virus is spread by percutaneous or mucous membrane exposure to infected blood or body fluids. Currently, injecting drug use accounts for the majority of HCV transmission in the U.S.[1,2] Other risk factors include poor infection control practices in health care settings (e.g., needlestick injuries), sexual contacts with infected partners, and births to infected mothers. Since the early 1990s, rates of acute hepatitis C cases in the U.S. have declined dramatically; the decrease reflects routine screening of blood and organ donors and increased knowledge and avoidance of risky behaviors.[1] There is no vaccine available to prevent HCV infection.

Most HCV infections of otherwise healthy adults have no or only mild acute clinical effects; however, most HCV infections (75-85%) persist in the livers of infected hosts. Persistent HCV infections can have slow and insidious pathophysiologic effects which, after decades, may manifest as clinically significant active liver disease. Chronic hepatitis C increases the risks of life threatening liver diseases such as cirrhosis and hepatocellular carcinoma, particularly when exacerbated by alcohol use.[3-6]

In the U.S. military, potential applicants are considered medically ineligible for service if they have current acute or chronic hepatitis, hepatitis carrier state, clinically apparent hepatitis within the preceding six months, persistent symptoms of hepatitis, or evidence of liver function impairment.[7] Because applicants to military service are not screened for HCV, HCV infected individuals may be able to enter service if they have no signs or symptoms of liver disease, or if they are unaware of, or do not report their infection statuses.

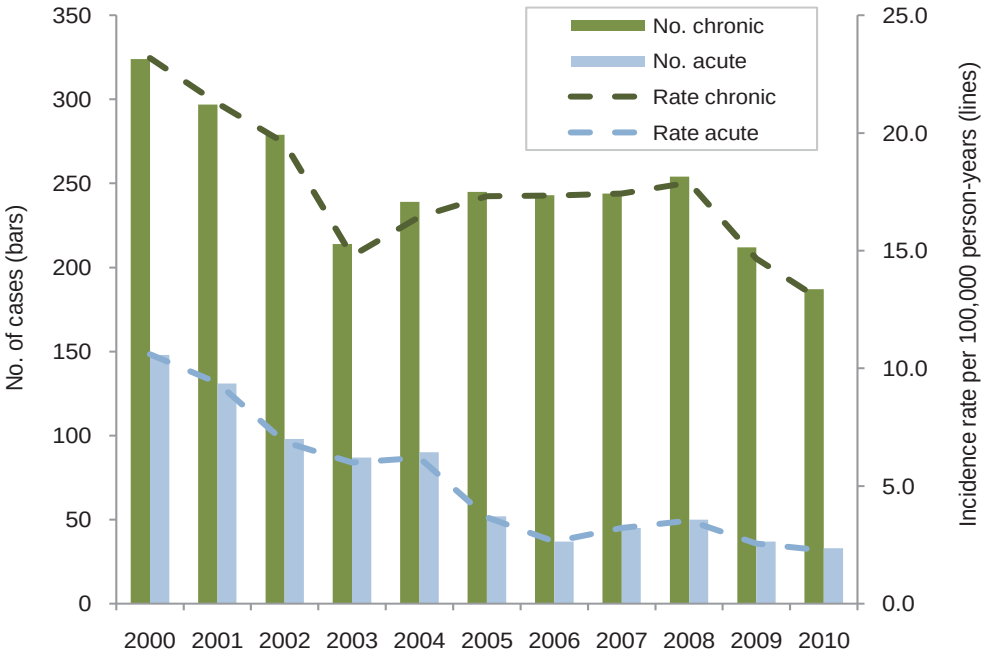
Hepatitis C is militarily important because it can degrade the operational capabilities of those affected. Also, because

TABLE 1. Acute and chronic hepatitis C, active component , U.S. Armed Forces, 2000-2010

	Acute hepatitis C			Chronic hepatitis C		
	No.	Rate[a]	IRR[b]	No.	Rate[a]	IRR[b]
Total	**808**	**5.16**	**.**	**2,738**	**17.48**	**.**
Sex						
Female	141	6.20	1.25	474	20.86	1.23
Male	667	4.98	Ref	2,264	16.91	Ref
Service						
Army	371	6.70	4.08	1,392	25.14	2.41
Navy	169	4.36	2.65	636	16.42	1.58
Air Force	218	5.71	3.47	426	11.16	1.07
Marine Corps	33	1.64	Ref	209	10.41	Ref
Coast Guard	17	3.97	2.41	75	17.50	1.68
Age Group						
17-19	73	4.81	1.17	149	9.81	0.66
20-29	353	4.13	1.01	1,041	12.19	0.82
30-39	172	4.11	Ref	620	14.80	Ref
40+	210	14.83	3.61	928	65.53	4.43
Race-ethnicity						
White, non-Hispanic	528	5.33	1.26	1,779	17.95	1.43
Black, non-Hispanic	136	4.93	1.16	446	16.16	1.28
Hispanic	79	5.04	1.19	294	18.74	1.49
Asian/Pacific Islander	30	4.24	Ref	89	12.59	Ref
American Indian/Alaskan Native	10	3.91	0.92	38	14.85	1.18
Other	25	5.38	1.27	92	19.81	1.57
Military Occupation						
Health	100	7.79	1.69	304	23.68	1.45
Combat-specific	147	4.61	Ref	521	16.34	Ref
Other	561	5.01	1.09	1,913	17.09	1.05

[a]Rate per 100,000 person-years
[b]Incidence Rate Ratio

FIGURE 1. Incident cases and incidence rates of acute and chronic hepatitis C, active component, U.S. Armed Forces, 2000-2010



HCV can be transmitted in blood, its presence increases risks associated with emergency battlefield blood transfusions (from HCV infected volunteer donors). In addition, there are significant costs associated with the clinical management of acute and long-term effects of hepatitis C. This report estimates the frequencies, incidence rates, and trends of diagnoses of hepatitis C from 2000-2010 among active component members of the U.S. Armed Forces.

METHODS

The surveillance period was 1 January 2000 to 31 December 2010. The surveillance population included all individuals who served in the active component of the Army, Navy, Air Force, Marine Corps, or Coast Guard any time during the surveillance period.

Incident cases were identified by searching for diagnoses of acute hepatitis C (ICD-9-CM: 070.41, 070.51) and chronic hepatitis C (ICD-9-CM: 070.44, 070.54, 070.70, 070.71, V02.62) in records of medical encounters of active component members in U.S. military and non-military (purchased care) medical facilities and in reports of notifiable medical events. An acute or chronic case was defined as an individual with a confirmed reportable medical event of hepatitis C; a single inpatient diagnosis (in any diagnostic position) of acute or chronic hepatitis C; or two diagnoses (in any diagnostic position) of acute hepatitis C or chronic hepatitis C during outpatient encounters not more than 90 days apart. The date of onset of each case was considered the date of the earliest reportable medical event, inpatient encounter, or outpatient encounter (in that priority) that contributed to defining the case. Each individual could be considered an incident case of acute and chronic hepatitis only once each during the surveillance period. For surveillance purposes, individuals who were ascertained as acute cases were considered incident chronic cases after a single subsequent outpatient diagnosis of chronic hepatitis C.

If diagnoses of acute and chronic hepatitis C occurred on the same day, only the chronic hepatitis C diagnosis was maintained for analysis; also, service members were not considered at risk of acute hepatitis C after any diagnosis of chronic hepatitis C. The countries of birth of hepatitis C cases were considered those reported when they were civilian applicants for military service. CDC travel guidelines were used to characterize some countries as "high endemicity" for hepatitis C.[8]

RESULTS

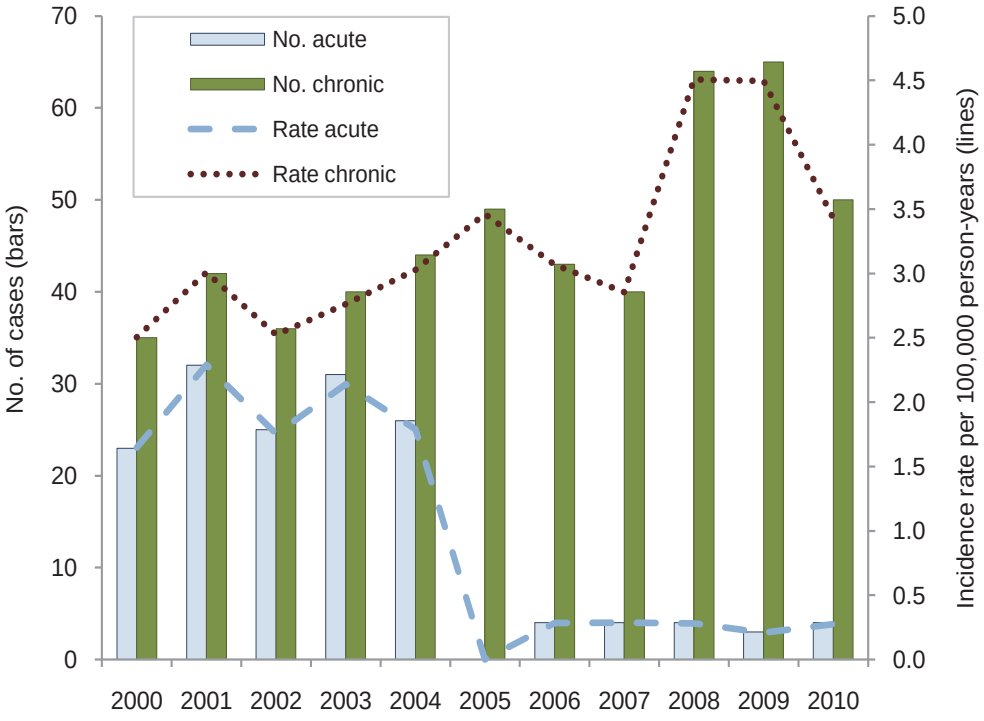
During the 11-year surveillance period there were 808 and 2,738 incident diagnoses of acute and chronic hepatitis C, respectively; overall incidence rates were 5.2 and 17.5 per 100,000 person-years (p-yrs), respectively **(Table 1).** In each year of the period and in each demographic and military subgroup, there were more cases and higher rates of incident diagnoses of chronic than acute hepatitis C **(Table 1, Figure 1).**

Overall, similar proportions of acute (n=156; 19.3%) and chronic hepatitis C (n=508; 18.6%) cases were hospitalized. While the numbers and rates of chronic hepatitis C cases that were hospitalized generally increased during the period, the numbers and rates of hospitalized acute hepatitis C cases were fairly stable from 2000 to 2004, sharply declined between 2004 and 2005, and were very low and stable from 2005 to 2010 **(Figure 2).**

Approximately one-half (51%) of all service members diagnosed as acute hepatitis C cases subsequently were diagnosed with chronic hepatitis C. Of service members who were diagnosed with both acute and chronic hepatitis C, 76 percent were diagnosed with chronic hepatitis C within 6 months, 85 percent within one year, and 94 percent within two years after their acute hepatitis C diagnoses **(data not shown).** On the other hand, of the 2,738 cases of chronic hepatitis C, only 410 (15%) had a preceding, recorded diagnosis of acute hepatitis C in their health care records.

Of hepatitis C affected service members whose countries of birth (n=1,779; 61% of total) were accessible for this analysis, 91 percent were from the United States and 6 percent from countries considered highly endemic for hepatitis C (in comparison, among active component members overall, 93% were born in the U.S. and 2% in countries highly endemic for hepatitis C) **(data not shown).**

FIGURE 2. Incidence rates of hospitalizations for acute and chronic hepatitis C, active component, U.S. Armed Forces, 2000-2010



ACUTE HEPATITIS C

Crude overall incidence rates of acute hepatitis C diagnoses steadily declined – by approximately 80 percent overall – during the period **(Figure 1)**. The crude overall incidence rate among females was 1.25 times that of males. Rates were higher in the Army than the other Service branches, and rates were higher among health care workers than those in other military occupational groups. Overall incident diagnosis rates did not sharply vary across racial/ethnic groups **(Table 1)**.

The crude rate of acute hepatitis C diagnoses among service members 40 years and older (14.8 per 100,000 p-yrs) was more than three times the rate of any younger age group **(Table 1)**. Throughout the period, rates of acute hepatitis C diagnoses were similar and gradually declined across all age groups younger than 40 years. In contrast, among those 40 years and older, rates of acute hepatitis C diagnoses very sharply declined from 2000 to 2006; as a result, rates were fairly similar across all age groups during the last five years of the period **(Figure 3a)**.

CHRONIC HEPATITIS C

Crude overall rates of chronic hepatitis C diagnoses sharply declined from 2000 to 2003, slightly increased from 2003 to 2008, and then declined again from 2008 to 2010. The rate of chronic hepatitis C diagnoses was approximately 45 percent lower in 2010 than 2000 **(Figure 1)**.

The crude overall rate of chronic hepatitis C diagnoses among females was 1.23 times that of males. Rates were higher in the Army than the other Service branches, and they were higher among health care workers than those in other military occupational groups. Overall incidence rates of chronic hepatitis C diagnoses did not sharply vary across racial/ethnic groups **(Table 1)**.

The crude rate of chronic hepatitis C diagnoses among service members 40 years and older (65.5 per 100,000 p-yrs) was more than four times that of any younger age group **(Table 1)**. Throughout the period, rates of chronic hepatitis C diagnoses were similar and fairly stable across all age groups younger than 40 years. In contrast, among those 40 years and older, rates of chronic hepatitis C diagnoses very sharply and consistently declined – by approximately 75 percent overall – during the period **(Figure 3b)**.

EDITORIAL COMMENT

As in the U.S. population,[1] among active component military members, incidence rates of acute hepatitis C diagnoses sharply and steadily declined from 2000 to 2010. The trends in both military and civilian populations likely reflect, at least in part, increasing awareness and avoidance of risky behaviors and comprehensive screening of blood products and transplanted organs. Of note in this regard, the U.S. military conducts numerous and varied programs aimed at preventing acquisition and transmission of HCV – as well as HBV and HIV-1. Countermeasures against hepatitis C and related infections include targeted health education programs; rigorous medical accession standards (i.e., drug screening, HIV testing); routine, randomized drug testing; routine periodic medical examinations – including HIV-1 antibody screening; testing of donors of blood products; universal precautions to prevent transmission of blood borne infections in health care settings; and others.[9]

There are limitations to this analysis that should be considered when interpreting the results. For example, because acute HCV infections are usually asymptomatic and thus often undiagnosed, the numbers and rates of acute hepatitis C diagnoses that are reported here undoubtedly underestimate the numbers and rates of new acquisitions by U.S. military members. It is noteworthy that this analysis found that only 15 percent of cases of chronic hepatitis C had antecedent medical record documentation of diagnoses of acute hepatitis C. Although the fact that most cases of acute hepatitis C are asymptomatic may explain much of this observation, it is also plausible that some cases of acute (initial) infection with HCV occurred before the start of military service. Also, the serologic assays routinely used for screening for HCV detect antibodies indicative of past or current HCV infections; however, the

assays do not distinguish between acute, chronic, and resolved infections. As such, the HCV infection statuses of those with positive screening test results cannot be determined from the test results alone; as a result, some infection statuses (i.e., acute versus chronic hepatitis C) may be inaccurately reported on records of medical encounters that document positive HCV screening test results.[10]

Because of the inherent difficulties in detecting new HCV infections – most are asymptomatic – and in determining infection statuses based on serologic test results alone, it is not surprising that chronic diagnoses far exceed acute diagnoses and that rates of diagnoses of chronic compared to acute hepatitis C have decreased more slowly. Additionally, because latency periods from times of infection acquisition to subsequent detection can be very long, many incident diagnoses of chronic hepatitis C may reflect infections that were acquired before specific and widespread preventive measures against HCV and similar blood borne pathogens were established. Because there is currently no screening for HCV among applicants for military service or during routine medical examinations during service, HCV infections of military members are usually detected when donating blood or during clinical evaluations of signs or symptoms compatible with liver disease.[11]

FIGURE 3A. Incidence rates of acute hepatitis C by age group, active component, U.S. Armed Forces, 2000-2010

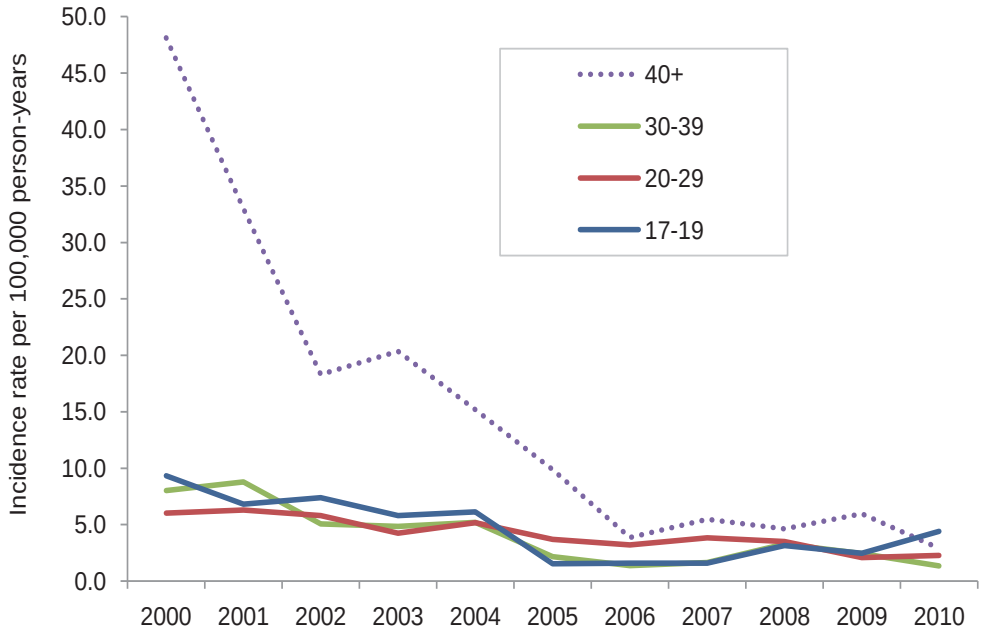
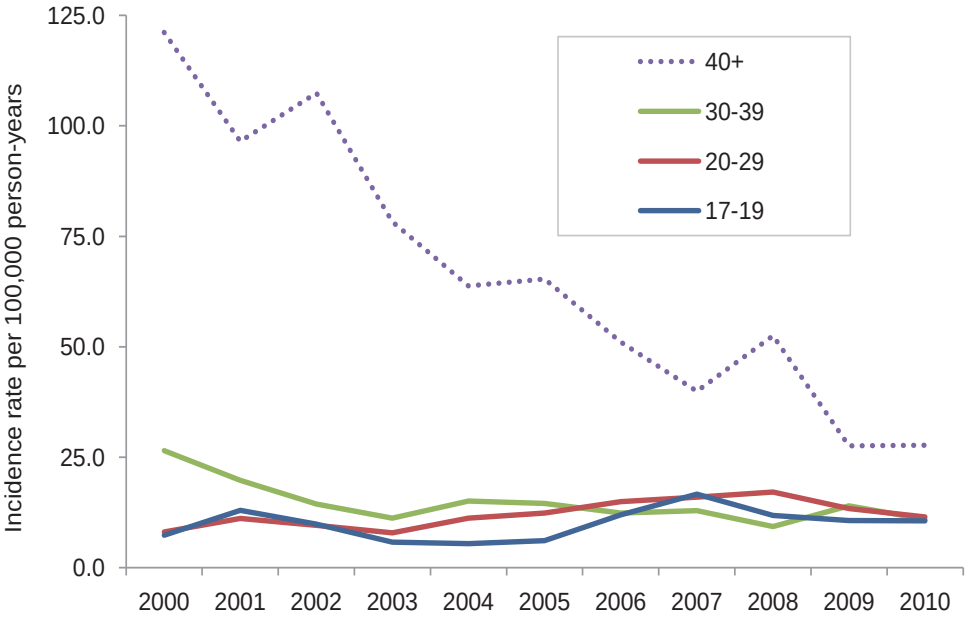


FIGURE 3B. Incidence rates of chronic hepatitis C by age group, active component, U.S. Armed Forces, 2000-2010



From 2000 to 2010, crude (unadjusted) rates of acute and chronic hepatitis C diagnoses were markedly lower in the Marine Corps than the other Services. Relative to other service members, Marines are younger, more often males, and more likely to serve in combat-specific than other military occupations; each of these characteristics is associated with relatively low hepatitis C diagnosis rates. In addition, the Marine Corps has the most restrictive policies regarding illicit drug use prior to entering service; as such, the Marine Corps may screen out relatively more individuals at increased risk of hepatitis C before they enter service.

The relatively large number of hepatitis C diagnoses among service members 40 years and older undoubtedly includes many infections that were acquired years before, but were not detected until just prior to, termination of service. All military members 35 years of age or older who separate or retire from military service are offered HCV testing; those with positive test results are clinically evaluated before they leave service.[7]

In this analysis, fifty-one percent of all service members who were diagnosed as acute cases were subsequently diagnosed as chronic hepatitis C cases; this proportion of acute infections that were documented as having become chronic is lower than that estimated (75%-85%) in the general U.S. population. Among affected U.S. military members, the proportion of acute

HCV infections that become chronic are undoubtedly underestimated by the findings of this analysis; many hepatitis C infected service members may leave service prior to evaluation for and diagnosis of their chronic infections. Of note in this regard, the relatively short durations between acute and chronic diagnoses among affected military members suggest relatively high levels of follow-up of newly diagnosed cases in the Military Health System.

In summary, this analysis documents large and consistent decreases in rates of acute hepatitis C diagnoses among military members over the past decade. In contrast, during each year from 2003 to 2010, there were from 187 to 254 new diagnoses of chronic hepatitis C. Chronic hepatitis C infections are often asymptomatic. However, individuals who are persistently infected with HCV can transmit the infection and are at risk of life threatening sequelae including cirrhosis and hepatocellular carcinoma.[3]

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Updates: Routine Screening for Antibodies to HIV-1, Civilian Applicants for U.S. Military Service and U.S. Armed Forces, Active and Reserve Components

During routine testing of civilian applicants for U.S. military service, the overall seroprevalence of antibodies to HIV-1 was lower in 2010 than in any year since 1990. Among members of the active components of the U.S. Army and Air Force, HIV-1 seroprevalences were higher in 2008-2010 than in recent prior years. Among members of the active components of the U.S. Navy and Marine Corps, the Marine Corps Reserve, and the Army National Guard, HIV-1 seroprevalences have slightly declined or remained relatively stable for at least ten years. In the reserve components of most of the service branches, it is difficult to discern long-term trends because of instability of seroprevalences observed in the relatively small numbers of reserve component members tested each year.

Human immunodeficiency virus, type 1 (HIV-1), causes a life-threatening illness with a prolonged clinical course. The virus is generally transmitted from person-to-person in blood (e.g., transfusions, contaminated needles) or during sexual encounters. The immune deficiency that occurs after HIV-1 infection increases risk of debilitating opportunistic infections and malignant neoplasms and limits the military operational capabilities of affected service members.

In order to provide appropriate medical evaluations, treatment, and counseling, prevent unwitting HIV-1 infection transmissions, and protect the battlefield blood supply, civilian applicants for service are screened for antibodies to HIV-1 during pre-accession medical examinations. Infection with HIV-1 is medically disqualifying for entry to U.S. military service. Members of the active and reserve components are routinely and periodically screened to detect newly acquired HIV-1 infections. Service members who are infected with HIV-1 receive clinical assessments, treatments, and counseling; they may remain in service as long as they are capable of performing their military duties.

Since October 1985, the U.S. military has conducted routine screening for antibodies to HIV-1 among civilian applicants for U.S. military service. Since 1986, all members of the active and reserve components of the U.S. Armed Forces have been periodically screened for antibodies to HIV-1. In 2004, the Department of Defense set a standard testing interval of two years for all service members.

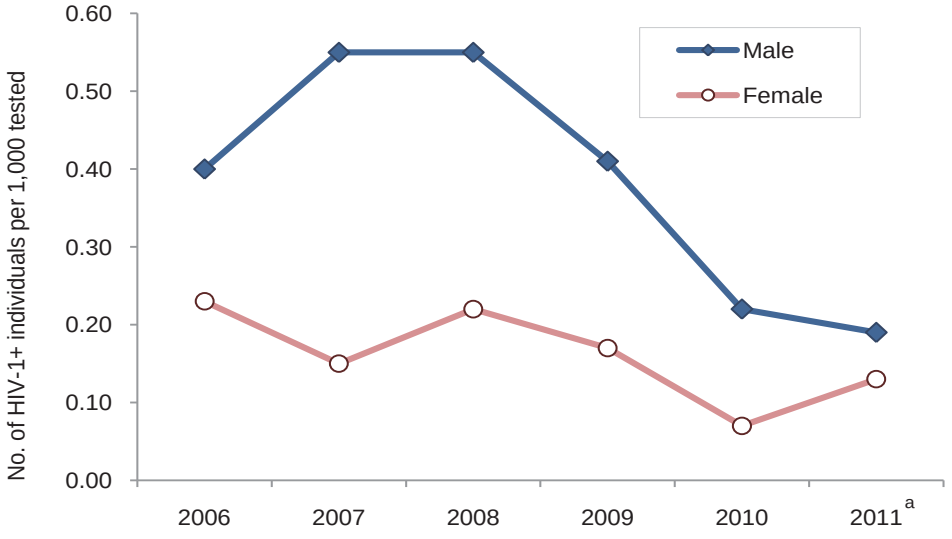
This report summarizes prevalences and trends of HIV-1 antibody seropositivity among civilian applicants for military service who have been screened since 2006. It also summarizes incident (first time per individual) diagnoses of HIV-1 antibody seropositivity among members of the active and reserve components of the U.S. military who are tested each year. Summaries of HIV-1 antibody seropositivity among civilian applicants and military members screened since 1990 are available on the Armed Forces Health Surveillance (AFHSC) website.

METHODS

Among civilian applicants for U.S. military service and U.S. military members, prevalences of HIV-1 antibody seropositivity were assessed by matching specimen numbers and serologic test results to the personal identifiers of the individuals who provided specimens. All results (except those from U.S. Air Force members) were accessed from records routinely maintained in the Defense Medical Surveillance System. Summary data from U.S. Air Force testing were provided by the Air Force for use in this report.

For summary purposes, an incident diagnosis of HIV-1 antibody seropositivity was defined as two "positive" results from serologic testing of two different specimens from the same individual (or one "positive" result from serologic testing of the most recent specimen provided by an individual).

FIGURE 1. Diagnoses of HIV-1 infections by gender, civilian applicants for U.S. military service, January 2006-June 2011



[a]Through 30 June 2011

Annual prevalences of HIV-1 seropositivity among civilian applicants for service were calculated by dividing the number of applicants identified as HIV-1 antibody seropositive during each calendar year by the number of applicants tested during the corresponding year. For annual summaries of routine screening among U.S. service members, denominators were the numbers of individuals in each component of each service branch who were tested at least once during the relevant calendar year.

RESULTS

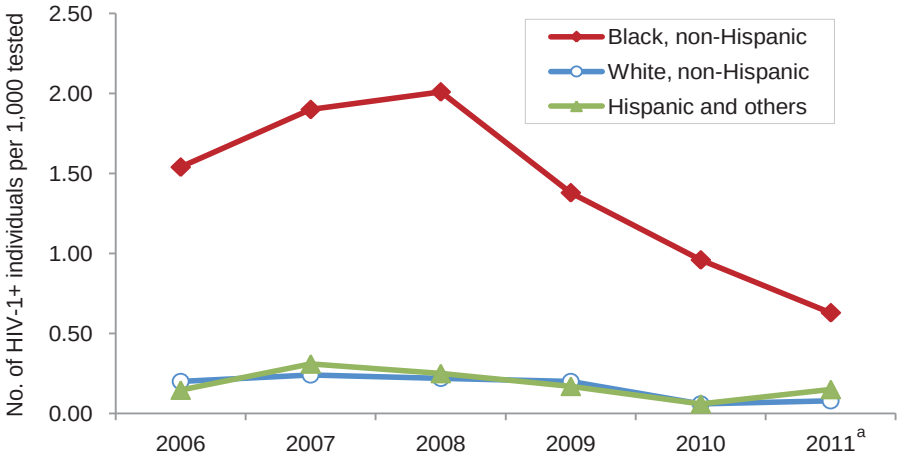
CIVILIAN APPLICANTS

During the 18-month period from January 2010 to June 2011, 539,087 tests for antibodies to HIV-1 were conducted among 522,799 civilian applicants for U.S. military service. During the period, 97 applicants were detected with antibodies to HIV-1 (seroprevalence: 0.19 per 1,000 tested) **(Table 1)**.

Among civilian applicants overall, annual prevalences of HIV-1 antibody seropositivity were relatively low and stable between 1996 and 2006[1], were higher in 2007 (0.47 per 1,000) and 2008 (0.48 per 1,000), and then declined through 2010 (0.19 per 1,000) to the lowest annual prevalence in the past 20 years. Among male applicants, seroprevalences generally increased to a relative plateau in 2007 and 2008[1] (0.53 per 1,000) and then declined sharply through 2010 (0.22 per 1,000). Among female applicants, annual seroprevalences have been low and stable since 2002 **(Table 1, Figure 1)**.

As in the past, in 2010, the seroprevalence was sharply higher among applicants who were black non-Hispanic (0.96 per

FIGURE 2. Diagnoses of HIV-1 infections by race/ethnicity, civilian applicants for U.S. military service, January 2006-June 2011



[a]Through 30 June 2011

TABLE 1. Diagnoses of HIV-1 infections by gender, civilian applicants for U.S. military service, January 2006-June 2011

Year	Total HIV tests	Total persons tested	Males tested	Females tested	Total HIV-1(+)	HIV-1(+) Male	HIV-1(+) Female	Overall rate per 1,000 tested	Male rate per 1,000 tested	Female rate per 1,000 tested
2006	268,930	**260,917**	209,135	51,782	**96**	84	12	**0.37**	0.40	0.23
2007	248,968	**242,677**	195,639	47,038	**114**	107	7	**0.47**	0.55	0.15
2008	289,494	**282,832**	229,307	53,525	**137**	125	12	**0.48**	0.55	0.22
2009	281,470	**275,115**	222,192	52,923	**100**	91	9	**0.36**	0.41	0.17
2010	320,106	**314,629**	255,238	59,391	**60**	56	4	**0.19**	0.22	0.07
2011[a]	218,981	**208,170**	170,547	37,623	**37**	32	5	**0.18**	0.19	0.13
Total	1,627,949	**1,584,340**	1,282,058	302,282	**544**	495	49	**0.34**	0.39	0.16

[a]Through 30 June 2011

TABLE 2. Diagnoses of HIV-1 infections by race/ethnicity, civilian applicants for U.S. military service, January 2006-June 2011

Year	Total HIV tests	Total persons tested	White non-Hispanic tested	Black non-Hispanic tested	Hispanic and others tested	Total HIV-1 (+)	White non-Hispanic HIV-1(+)	Black non-Hispanic HIV-1(+)	Hispanic and others HIV-1(+)	Overall rate per 1,000 tested	White non-Hispanic rate per 1,000 tested	Black non-Hispanic rate per 1,000 tested	Hispanic and others rate per 1,000 tested
2006	268,930	**260,917**	178,716	34,400	47,801	**96**	36	53	7	**0.37**	0.20	1.54	0.15
2007	248,968	**242,678**	165,253	32,174	45,251	**114**	39	61	14	**0.47**	0.24	1.90	0.31
2008	289,494	**282,832**	188,740	41,247	52,845	**137**	41	83	13	**0.48**	0.22	2.01	0.25
2009	281,470	**275,123**	183,566	39,725	51,832	**100**	36	55	9	**0.36**	0.20	1.38	0.17
2010	320,106	**314,629**	216,285	44,678	53,666	**60**	14	43	3	**0.19**	0.06	0.96	0.06
2011[a]	218,981	**208,170**	143,728	31,830	32,612	**37**	12	20	5	**0.18**	0.08	0.63	0.15
Total	1,627,949	**1,584,349**	1,076,288	224,054	284,007	**544**	178	315	51	**0.34**	0.17	1.41	0.18

[a]Through 30 June 2011

TABLE 3. New diagnoses of HIV-1 infections, by gender, active component, U.S. Army, January 2006-June 2011

Year	Total HIV tests	Total persons tested	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+) Male	New HIV-1 (+) Female	Overall rate per 1,000 tested	Male rate per 1,000 tested	Female rate per 1,000 tested	HIV-1(+) still in military service in 2011
2006	502,953	**411,413**	352,518	58,895	**66**	63	3	**0.16**	0.18	0.05	32
2007	454,180	**381,056**	324,779	56,277	**60**	58	2	**0.16**	0.18	0.04	32
2008	511,131	**420,023**	361,161	58,862	**94**	93	1	**0.22**	0.26	0.02	58
2009	558,244	**430,919**	373,797	57,122	**88**	85	3	**0.20**	0.23	0.05	60
2010	589,476	**451,413**	390,119	61,294	**90**	87	3	**0.20**	0.22	0.05	78
2011[a]	281,084	**256,226**	221,102	35,124	**55**	55	0	**0.21**	0.25	0.00	55
Total	2,897,068	**2,351,050**	2,023,476	327,574	**453**	441	12	**0.19**	0.22	0.04	315

[a]Through 30 June 2011

TABLE 4. New diagnoses of HIV-1 infections, by gender, U.S. Army National Guard, January 2006-June 2011

Year	Total HIV tests	Total persons tested	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+) Male	New HIV-1 (+) Female	Overall rate per 1,000 tested	Male rate per 1,000 tested	Female rate per 1,000 tested	HIV-1(+) still in military service in 2011
2006	196,104	**175,109**	151,394	23,715	**38**	33	5	**0.22**	0.22	0.21	8
2007	201,772	**182,377**	157,839	24,538	**52**	49	3	**0.29**	0.31	0.12	18
2008	234,674	**209,531**	180,389	29,142	**51**	49	2	**0.24**	0.27	0.07	16
2009	242,318	**201,755**	174,591	27,164	**56**	54	2	**0.28**	0.31	0.07	29
2010	240,507	**197,744**	170,289	27,455	**38**	37	1	**0.19**	0.22	0.04	29
2011[a]	113,695	**104,340**	90,189	14,151	**27**	27	0	**0.26**	0.30	0.00	27
Total	1,229,070	**1,070,856**	924,691	146,165	**262**	249	13	**0.24**	0.27	0.09	127

[a]Through 30 June 2011

TABLE 5. New diagnoses of HIV-1 infections, by gender, U.S. Army Reserve, January 2006-June 2011

Year	Total HIV tests	Total persons tested	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+) Male	New HIV-1 (+) Female	Overall rate per 1,000 tested	Male rate per 1,000 tested	Female rate per 1,000 tested	HIV-1(+) still in military service in 2011
2006	96,668	**84,682**	66,147	18,535	**34**	31	3	**0.40**	0.47	0.16	17
2007	110,743	**98,804**	76,526	22,278	**42**	40	2	**0.43**	0.52	0.09	16
2008	109,184	**97,456**	74,537	22,919	**42**	37	5	**0.43**	0.50	0.22	25
2009	111,738	**94,255**	73,197	21,058	**33**	31	2	**0.35**	0.42	0.09	20
2010	113,184	**93,665**	73,117	20,548	**35**	35	0	**0.37**	0.48	0.00	35
2011[a]	50,800	**46,385**	36,294	10,091	**20**	19	1	**0.43**	0.52	0.10	20
Total	592,317	**515,247**	399,818	115,429	**206**	193	13	**0.40**	0.48	0.11	133

[a]Through 30 June 2011

1,000) than white non-Hispanic (0.06 per 1,000) or Hispanic/other (0.06 per 1,000) racial/ethnic identities. In all racial/ethnic groups, HIV-1 seroprevalences were lower in 2010 than in any of the previous 5 years **(Table 2, Figure 2)**.

U.S. ARMY

Active component: During the 18-month period from January 2010 through June 2011, 870,560 tests for antibodies to HIV-1 were conducted among 707,639 soldiers in the active component of the U.S. Army. During the period, 145 soldiers (0.20 per 1,000 persons tested) were detected with antibodies to HIV-1 **(Table 3)**.

During 2010, there were 90 incident diagnoses of HIV-1 infection among active component soldiers. The overall prevalence of seropositivity was 0.21 per 1,000 soldiers tested; on average, one new HIV-1 infected soldier was detected per 6,550 screening tests **(Table 3)**.

From 2000 through 2007, annual seroprevalences were relatively stable[1]; in 2008, there were more incident diagnoses of HIV-1 infections and a higher prevalence of HIV-1 antibody seropositivity than in any year since 1995. Since 2008, rates have remained high compared to recent prior years. The increases in the numbers and prevalences of incident diagnoses of HIV-1 overall since 2008 were entirely attributable to increases among men; since 2001, rates of HIV-1 seropositivity among active component female soldiers have been low and stable, with between 1 and 4 new infections detected in each year **(Table 3, Figure 3)**. Finally, of the 453 active component soldiers diagnosed with HIV-1 infections since 2006, 315 (70%) were still in service in 2011 **(Table 3)**.

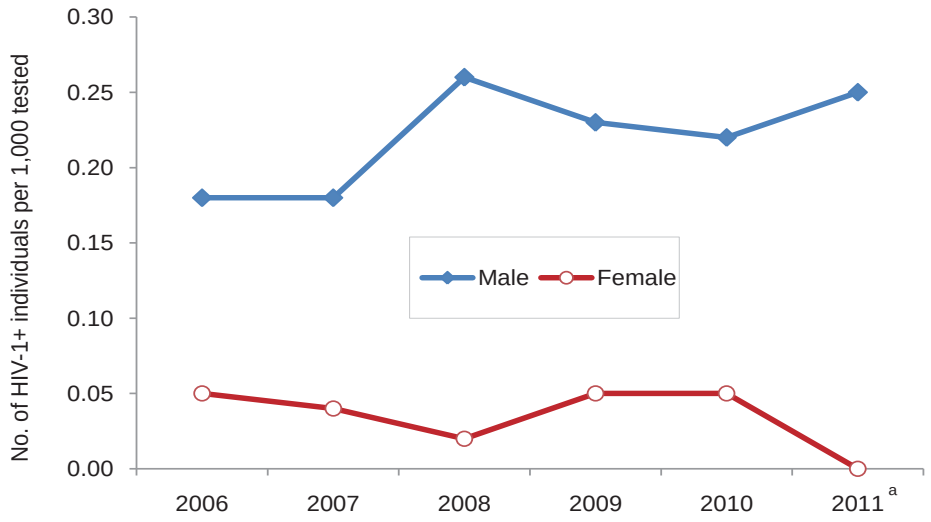
Army National Guard: During the 18-month period from January 2010 through June 2011, 354,202 tests for antibodies to HIV-1 were conducted among 302,084 members of the U.S. Army National Guard. During the period, 65 soldiers (0.22 per 1,000 persons tested) were detected with antibodies to HIV-1 **(Table 4)**.

During 2010, there were 38 incident diagnoses of HIV-1 infection among National Guard soldiers. The overall prevalence of seropositivity was 0.19 per 1,000 soldiers tested. The annual prevalence in 2010 was consistent with the annual prevalences documented in the Army National Guard since 1998. In 2009, on average, one new HIV-1 infected National Guard soldier was detected per 6,329 screening tests. Of the 262 National Guard soldiers diagnosed with HIV-1 infections since 2006, 127 (49%) were still in service in 2011 **(Table 4)**.

Army Reserve: During the 18-month period from January 2010 through June 2011, 163,984 tests for antibodies to HIV-1 were conducted among 140,050 soldiers in the U.S. Army Reserve. During the period, 55 soldiers (0.39 per 1,000 tested) were detected with antibodies to HIV-1 **(Table 5)**.

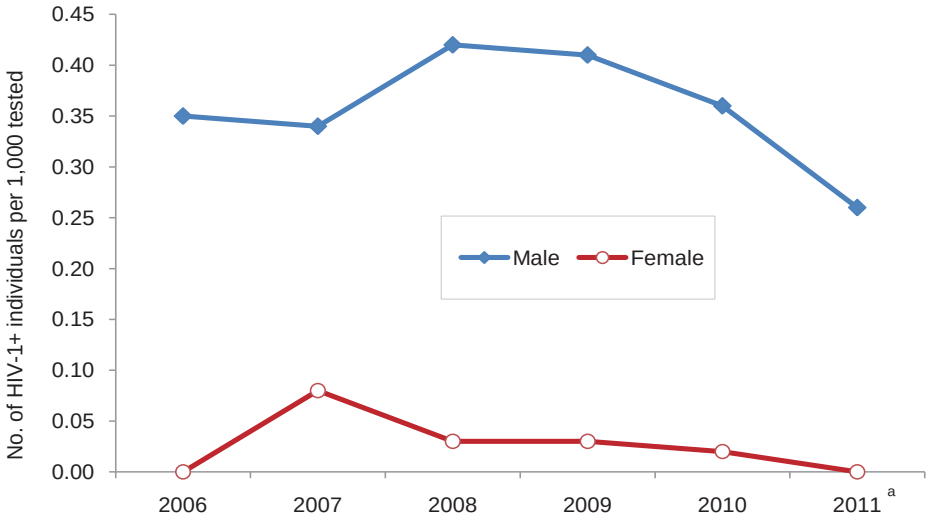
During calendar year 2010, there were 35 incident diagnoses of HIV-1 infection among U.S. Army Reserve soldiers; the overall seropositivity was 0.37 per 1,000 soldiers tested. In 2010, on average, one new HIV-1 infected soldier was detected per 3,234 screening tests. The prevalence of HIV-1 antibody seropositivity among females remains low; among female reserve soldiers, there were no incident diagnoses of HIV-1 seropositivity in 2010 and one in the first half of 2011. Of the 206 Army

FIGURE 3. New diagnoses of HIV-1 infections, by gender, active component, U.S. Army, January 2006-June 2011



[a]Through 30 June 2011

FIGURE 4. New diagnoses of HIV-1 infections, active component, U.S. Navy, January 2006-June 2011



[a]Through 30 June 2011

TABLE 6. New diagnoses of HIV-1 infections, active component, U.S. Navy, January 2006-June 2011

Year	Total HIV tests	Total persons tested	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+) Male	New HIV-1 (+) Female	Overall rate per 1,000 tested	Male rate per 1,000 tested	Female rate per 1,000 tested	HIV-1(+) still in military service in 2011
2006	319,558	**267,104**	225,606	41,498	**79**	79	0	**0.30**	0.35	0.00	34
2007	282,501	**239,413**	201,470	37,943	**72**	69	3	**0.30**	0.34	0.08	41
2008	286,917	**242,669**	204,000	38,669	**86**	85	1	**0.35**	0.42	0.03	54
2009	280,771	**238,092**	198,845	39,247	**83**	82	1	**0.35**	0.41	0.03	57
2010	282,813	**239,865**	199,462	40,403	**72**	71	1	**0.30**	0.36	0.02	66
2011[a]	135,046	**126,277**	104,400	21,877	**27**	27	0	**0.21**	0.26	0.00	27
Total	1,587,606	**1,353,420**	1,133,783	219,637	**419**	413	6	**0.31**	0.36	0.03	279

[a]Through 30 June 2011

TABLE 7. New diagnoses of HIV-1 infections, by gender, Navy Reserve, U.S. Navy, January 2006-June 2011

Year	Total HIV tests	Total persons tested	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+) Male	New HIV-1 (+) Female	Overall rate per 1,000 tested	Male rate per 1,000 tested	Female rate per 1,000 tested	HIV-1(+) still in military service in 2011
2006	59,297	**49,808**	40,252	9,556	**12**	12	0	**0.24**	0.30	0.00	4
2007	57,492	**48,959**	39,693	9,266	**15**	14	1	**0.31**	0.35	0.11	8
2008	54,595	**46,946**	38,108	8,838	**11**	11	0	**0.23**	0.29	0.00	5
2009	54,180	**45,293**	36,835	8,458	**10**	10	0	**0.22**	0.27	0.00	8
2010	54,266	**45,464**	36,922	8,542	**19**	19	0	**0.42**	0.51	0.00	18
2011[a]	26,397	**24,898**	20,293	4,605	**6**	6	0	**0.24**	0.30	0.00	6
Total	306,227	**261,368**	212,103	49,265	**73**	72	1	**0.28**	0.34	0.02	49

[a]Through 30 June 2011

Reservists diagnosed with HIV-1 infections since 2006, 133 (65%) were still in service in 2011 **(Table 5)**.

U.S. NAVY

Active component: During the 18-month period from January 2010 through June 2011, 417,859 tests for antibodies to HIV-1 were conducted among 366,142 sailors of the active component of the U.S. Navy. During the period, 99 sailors (0.27 per 1,000 persons tested) were detected with antibodies to HIV-1 **(Table 6)**.

During 2010, there were 72 incident diagnoses of HIV-1 infections among active component sailors. The overall prevalence of seropositivity was 0.30 per 1,000 sailors tested. Rates in females have remained low; among female active component sailors, there was one incident diagnosis of HIV-1 seropositivity in 2010 and none in the first half of 2011 **(Table 6, Figure 4)**. In 2010, on average, one new HIV-1 infected sailor was detected per 3,928 screening tests. Of the 419 active component sailors diagnosed with HIV-1 infections since 2006, 279 (67%) were still in service in 2010 **(Table 6)**.

Navy Reserve: During the 18-month period from January 2010 through June 2011, 80,663 tests for antibodies to HIV-1 were conducted among 70,362 sailors in the U.S. Navy Reserve. During the period, 25 sailors (0.36 per 1,000 tested) were detected with antibodies to HIV-1 **(Table 7)**.

TABLE 8. New diagnoses of HIV-1 infections, by gender, active component, U.S. Marine Corps, January 2006-June 2011

Year	Total HIV tests	Total persons tested	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+) Male	New HIV-1 (+) Female	Overall rate per 1,000 tested	Male rate per 1,000 tested	Female rate per 1,000 tested	HIV-1(+) still in military service in 2011
2006	186,168	**147,623**	138,388	9,235	**18**	17	1	**0.12**	0.12	0.11	5
2007	183,477	**148,826**	139,600	9,226	**20**	19	1	**0.13**	0.14	0.11	12
2008	188,537	**151,327**	141,672	9,655	**19**	19	0	**0.13**	0.13	0.00	8
2009	192,131	**153,998**	143,810	10,188	**23**	23	0	**0.15**	0.16	0.00	13
2010	187,533	**153,241**	142,535	10,706	**19**	19	0	**0.12**	0.13	0.00	14
2011[a]	99,047	**91,919**	85,636	6,283	**10**	10	0	**0.11**	0.12	0.00	10
Total	1,036,893	**846,934**	791,641	55,293	**109**	107	2	**0.13**	0.14	0.04	62

[a]Through 30 June 2011

TABLE 9. New diagnoses of HIV-1 infections, by gender, U.S. Marine Corps Reserve, January 2006-June 2011

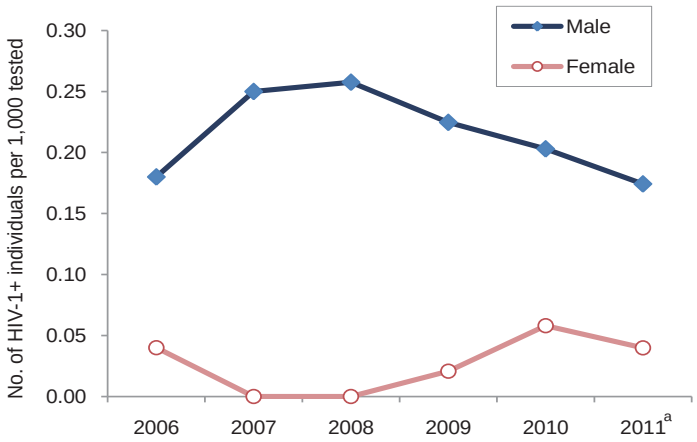
Year	Total HIV tests	Total persons tested	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+) Male	New HIV-1 (+) Female	Overall rate per 1,000 tested	Male rate per 1,000 tested	Female rate per 1,000 tested	HIV-1(+) still in military service in 2011
2006	30,484	**26,105**	24,943	1,162	**6**	6	0	**0.23**	0.24	0.00	0
2007	29,871	**25,542**	24,413	1,129	**6**	6	0	**0.23**	0.25	0.00	2
2008	29,489	**25,953**	24,858	1,095	**7**	7	0	**0.27**	0.28	0.00	4
2009	29,327	**25,028**	23,988	1,040	**5**	5	0	**0.20**	0.21	0.00	4
2010	28,904	**25,314**	24,214	1,100	**6**	6	0	**0.24**	0.25	0.00	6
2011[a]	17,096	**15,840**	15,168	672	**3**	3	0	**0.19**	0.20	0.00	3
Total	165,171	**143,782**	137,584	6,198	**33**	33	0	**0.23**	0.24	0.00	19

[a]Through 30 June 2011

FIGURE 5. New diagnoses of HIV-1 infections, by gender, active component, U.S. Marine Corps, January 2006-June 2011

[a]Through 30 June 2011

FIGURE 6. New diagnoses of HIV-1 infections, by gender, active component, U.S. Air Force, January 2006-June 2011



[a]Through 30 June 2011

TABLE 10. New diagnoses of HIV-1 infections, by gender, active component, U.S. Air Force, January 2006-June 2011

Year	Total HIV tests	Total persons tested	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+), males	New HIV-1 (+), females	Overall rate per 1,000 tested	Male rate per 1,000 tested	Female rate per 1,000 tested
2006	251,161	**228,686**	182,501	46,185	**34**	32	2	**0.15**	0.18	0.04
2007	229,556	**204,424**	162,738	41,686	**40**	40	0	**0.20**	0.25	0.00
2008	268,263	**237,393**	190,215	47,178	**49**	49	0	**0.21**	0.26	0.00
2009	290,056	**244,077**	195,826	48,251	**45**	44	1	**0.18**	0.22	0.02
2010	282,446	**263,451**	211,830	51,621	**46**	43	3	**0.17**	0.20	0.06
2011[a]	136,060	**128,347**	103,299	25,048	**19**	18	1	**0.15**	0.17	0.04
Total	1,457,542	**1,306,378**	1,046,409	259,969	**233**	226	7	**0.18**	0.22	0.03

[a]Through 30 June 2011

TABLE 11. New diagnoses of HIV-1 infections, by gender, Air National Guard, U.S. Air Force, January 2006-June 2011

Year	Total HIV tests	Total persons tested	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+), males	New HIV-1 (+), females	Overall rate per 1,000 tested	Male rate per 1,000 tested	Female rate per 1,000 tested
2006	15,275	**14,100**	11,269	2,831	**8**	8	0	**0.57**	0.71	0.00
2007	15,296	**14,044**	11,321	2,723	**2**	1	1	**0.14**	0.09	0.37
2008	25,976	**23,004**	19,020	3,984	**2**	2	0	**0.09**	0.11	0.00
2009	31,577	**27,083**	22,684	4,399	**4**	4	0	**0.15**	0.18	0.00
2010	24,294	**22,612**	18,837	3,775	**0**	0	0	**0.00**	0.00	0.00
2011[a]	19,140	**18,119**	15,057	3,062	**1**	1	0	**0.06**	0.07	0.00
Total	131,558	**118,962**	98,188	20,774	**17**	16	1	**0.14**	0.16	0.05

[a]Through 30 June 2011

During calendar year 2010, there were 19 incident diagnoses of HIV-1 infection among U.S. Navy Reserve sailors; the overall seropositivity was 0.42 per 1,000 sailors tested. Among female reserve sailors, there have been no incident diagnoses of HIV-1 seropositivity since 2007 (and only 13 reported in the past 21 years).

In 2010, on average, one new HIV-1 infected sailor was detected per 2,856 screening tests. Of the 73 reserve component sailors diagnosed with HIV-1 infections since 2006, 49 (67%) were still in service in 2011 **(Table 7)**.

U.S. MARINE CORPS

Active component: During the 18-month period from January 2010 through June 2011, 286,580 tests for antibodies to HIV-1 were conducted among 245,160 members of the active component of the U.S. Marine Corps. During the period, 29 Marines (0.12 per 1,000 persons tested) were detected with antibodies to HIV-1 **(Table 8)**.

During 2010, there were 19 incident diagnoses of HIV-1 infection among active component Marines. The overall prevalence of seropositivity was 0.12 per 1,000

TABLE 12. New diagnoses of HIV-1 infections, by gender, Air Force Reserve, U.S. Air Force, January 2006-June 2011

Year	Total HIV tests	Total persons tested*	Males tested	Females tested	Total new HIV-1 (+)	New HIV-1 (+), males	New HIV-1 (+), females	Overall rate per 1,000 tested	Male rate per 1,000 tested	Female rate per 1,000 tested
2006	22,982	**21,432**	16,746	4,686	**8**	8	0	**0.37**	0.48	0.00
2007	26,824	**24,953**	19,579	5,374	**6**	5	1	**0.24**	0.26	0.19
2008	26,487	**24,054**	18,581	5,473	**5**	5	0	**0.21**	0.27	0.00
2009	27,720	**24,882**	19,364	5,518	**6**	6	0	**0.24**	0.31	0.00
2010	25,101	**23,938**	18,584	5,354	**9**	9	0	**0.38**	0.48	0.00
2011[a]	15,338	**14,686**	11,522	3,164	**3**	3	0	**0.20**	0.26	0.00
Total	144,452	**133,945**	104,376	29,569	**37**	36	1	**0.28**	0.34	0.03

[a]Through 30 June 2011

Marines tested **(Table 8, Figure 5)**. During the past 12 years (1999-2010), annual numbers of new HIV-1 infectious detected among Marines were fairly consistent, ranging from 12 to 24 among males and 0 to 3 among females. In 2010, on average, one new HIV-1 infected Marine was detected per 9,870 screening tests. Of the 109 active component Marines diagnosed with HIV-1 infections since 2006, 62 (57%) were still in service in 2011 **(Table 8)**.

U.S. Marine Corps Reserve: During the 18-month period from January 2010 through June 2011, 46,000 tests for antibodies to HIV-1 were conducted among 41,154 Marines in the U.S. Marine Corps Reserve. During the period, 9 Marine Corps Reservists (0.22 per 1,000 tested) were detected with antibodies to HIV-1 **(Table 9)**.

During 2010, there were six incident diagnoses of HIV-1 infection among Marine Corps Reservists; the overall seropositivity was 0.24 per 1,000 Marines tested. In 2010, on average, one new HIV-1 infected Marine was detected per 4,817 screening tests **(Table 7)**. Of note, in the past 21 years, there have been no incident diagnoses of HIV-1 infection among female Marine Reservists. Of the 33 Marine Reservists diagnosed with HIV-1 infections since 2006, 19 (58%) were still in service in 2011 **(Table 9)**.

U.S. COAST GUARD

Active component: During the 18-month period from January 2010 through June 2011, 37,132 tests for antibodies to HIV-1 were conducted among 35,357 members of the active component of the U.S. Coast Guard. During the period, six Coast Guard members (0.17 per 1,000 persons tested) were detected with antibodies to HIV-1 **(data not shown)**.

During 2010, there were five incident diagnoses of HIV-1 infection among active component Coast Guard members. The overall prevalence of seropositivity was 0.22 per 1,000 Coast Guardsmen tested. In 2010, on average, one new HIV-1 Coast Guard member was detected per 4,813 screening tests. Of the 21 active component Coast Guardsman diagnosed with HIV-1 infections since 2006, 17 (81%) were still in service in 2011. In 2010, two female Coast Guard members were diagnosed with HIV-1; these were the first incident diagnoses of seropositivity among females since 1996 **(data not shown)**.

Coast Guard Reserve: Since 2006, there were two incident diagnoses of HIV-1 seropositivity among male members of the Coast Guard Reserve; neither of these individuals were still in service in 2011 **(data not shown)**.

U.S. AIR FORCE

Active component: From January 2010 through July 2011, 418,506 tests for antibodies to HIV-1 were conducted among 391,798 members of the active component of the U.S. Air Force. During the period, 65 airmen (0.17 per 1,000 tested) were detected with antibodies to HIV-1. On average, one new HIV-1 infection was detected per 6,140 screening tests **(Table 10)**. From 2007 to 2010, there were from 40 to 49 male active component airmen detected with antibodies to HIV-1 each year. Since 1996, there have been three or fewer female airmen detected with HIV-1 infections each year **(Table 10, Figure 6)**.

Air National Guard: From January 2010 through July 2011, 43,434 tests for antibodies to HIV-1 were conducted among 40,731 members of the Air National Guard. During the period, one airman (0.03 per 1,000 tested) was detected with antibodies to HIV-1. Among Air National Guard members, only 16 males and one female have been diagnosed with HIV-1 infections since 2006 **(Table 11)**.

Air Force Reserve: From January 2010 through July 2011, 40,439 tests for antibodies to HIV-1 were conducted among 38,642 members of the U.S. Air Force Reserve. During the period, 12 airmen (0.31 per 1,000 tested) were detected with antibodies to HIV-1. In 2010, on average, one new HIV-1 infection was detected per 2,789 screening tests. The seroprevalence among those tested in 2010 was consistent with recent prior years **(Table 12)**.

Data summaries for the U.S. Air Force provided by USAFSAM.

EDITORIAL COMMENT

The U.S. military began routine screening for antibodies to HIV-1 among civilian applicants for all military services in October 1985. Routine periodic screening of all members of all components of the Services began shortly thereafter. During the "first rounds" of HIV-1 antibody testing in the

Services, new detections of HIV-1 infections were relatively frequent because most service members had not previously been tested; thus, both long-standing (prevalent) and recently acquired (incident) infections were subject to detection during the first round of routine screening. By 1990, nearly all service members had been tested for antibodies to HIV-1 at least once — as civilian applicants for military service and/or while serving in the military. As a result, since then, routine periodic screening has detected infections that were acquired since the last negative test of the service member (incident infections).

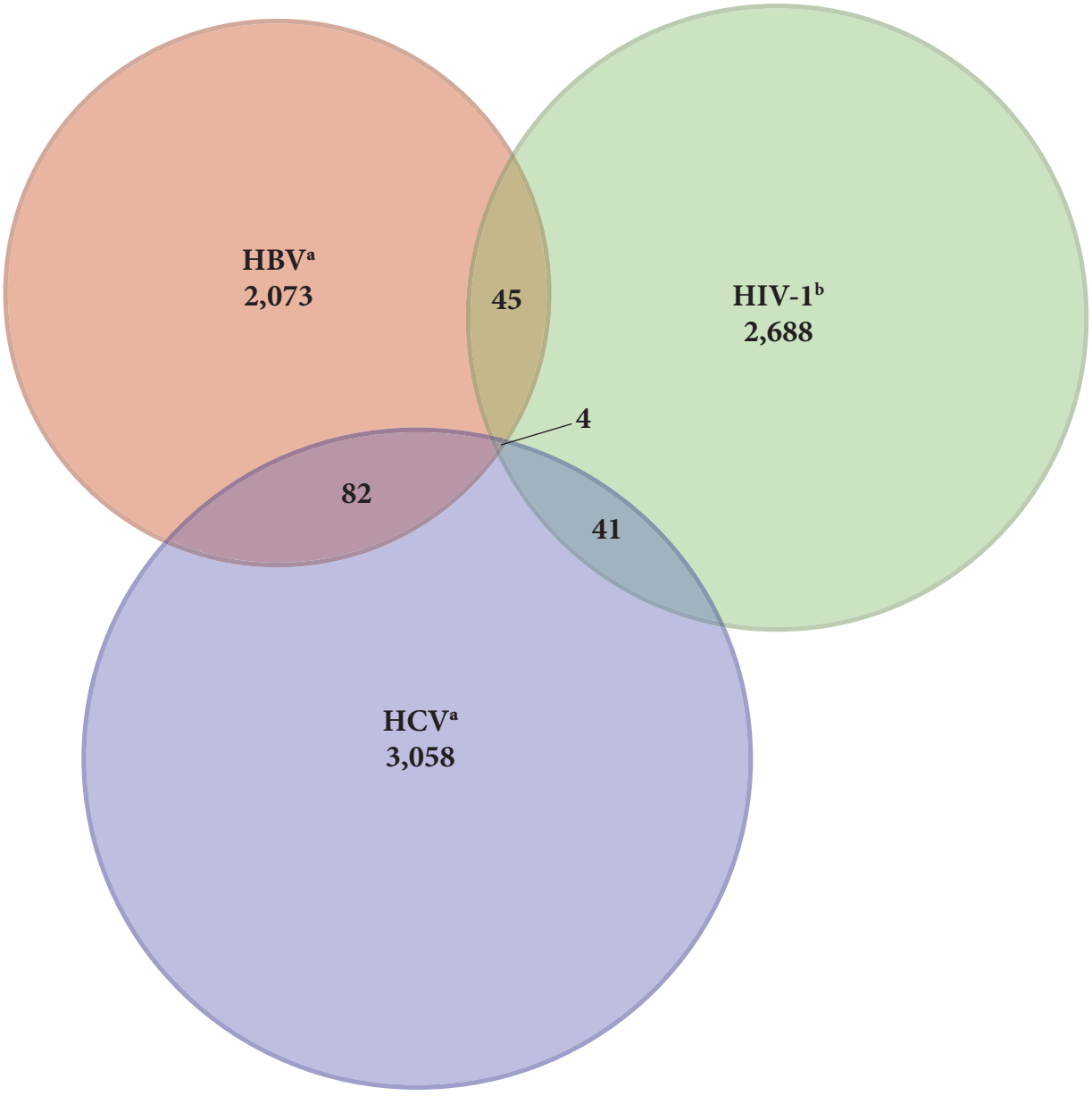
In 2010, prevalences of HIV-1 infection among male and female civilian applicants were one half those of 2009 and the lowest of any year since testing began. Also, among both active and reserve component members of the U.S. military, HIV-1 seroprevalences remain relatively low, particularly among females.

Results of routine, periodic screening for HIV-1 in dynamic (i.e., continuously changing) military populations must be interpreted cautiously; in particular, comparisons of annual rates and trends of seropositivity across services and components can be misleading. For example, prevalences of seropositivity in repeatedly screened populations depend not only on rates at which new infections are acquired but also on testing frequencies. Even if rates of acquisition of HIV-1 infections (infection incidence rates) were identical in two serially tested populations, prevalences of seropositivity would be different if the intervals between testing rounds were not the same (because the longer the interval, the more undetected infections accumulate between testing rounds). Thus, for example, increases or declines in observed seroprevalences during routine periodic screening could reflect changes in rates of infection acquisition and/or decreases or increases, respectively, in test intervals. In turn, differences in observed seroprevalences across services or components could reflect differences in rates of infection acquisition and/or differences in testing policies and practices. Of note in this regard, there is a now a standard two-year interval (applicable to all services) between mandatory period HIV-1 antibody tests; still however, some service members are tested more frequently (given other indications for testing).

With the above caveats in mind, the monitoring of results and trends of HIV-1 seroprevalences in various military populations can help target and focus prevention initiatives.

Surveillance Snapshot: Service Members with Hepatitis B, Hepatitis C, and HIV-1, Active Component, U.S. Armed Forces

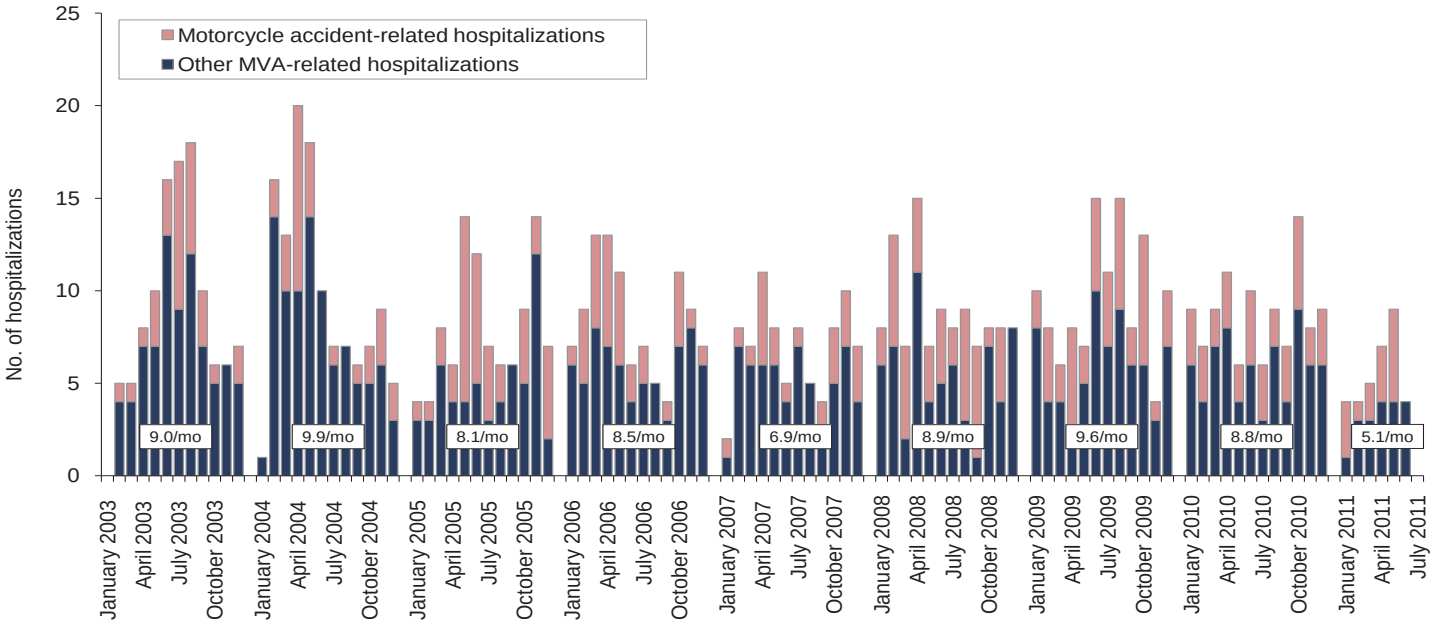
Risk factors and routes of transmission of hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) are similar; therefore, individuals infected with one of these viruses may be coinfected or at high risk of acquiring another infection. Among active component service members diagnosed with HBV infections (n=2,204) between 2000 and 2010, 86 (3.9%) were also diagnosed with HCV and 49 (2.2%) with HIV-1. Among service members diagnosed with HCV infections (n=3,185) between 2000 and 2010, 86 (2.7%) were diagnosed with HBV and 45 (1.4%) with HIV-1. Four service members were diagnosed with HBV, HCV, and HIV-1 during the period **(figure below)**. Individuals diagnosed with HIV-1, HBV, or HCV infections should be tested for coinfections and counseled to prevent acquisitions of similarly transmitted infections.



[a]HBV and HCV cohorts: service members diagnosed during 2000-2010
[b]HIV-1 cohort: service members who served in an active component during 2000-2010 and were diagnosed with HIV-1 at any time during service

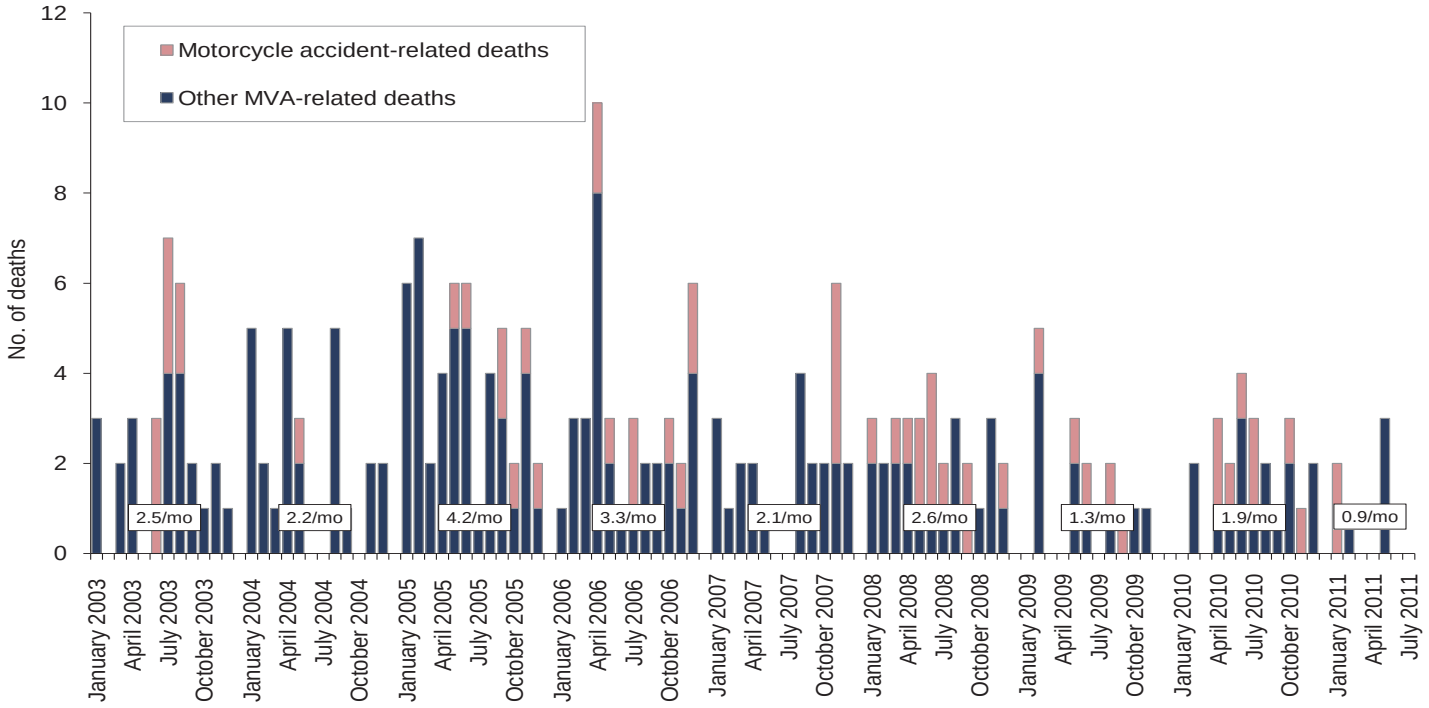
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - July 2011 (data as of 25 August 2011)

Motor vehicle accident-related hospitalizations (outside of the operational theater) (ICD-9-CM: E810-E825; NATO Standard Agreement 2050 (STANAG): 100-106, 107-109, 120-126, 127-129)



Note: Hospitalization (one per individual) while deployed to/within 90 days of returning from OEF/OIF/OND. Excludes accidents involving military-owned/special use motor vehicles. Excludes individuals medically evacuated from CENTCOM and/or hospitalized in Landstuhl, Germany within 10 days of a motor vehicle accident-related hospitalization.

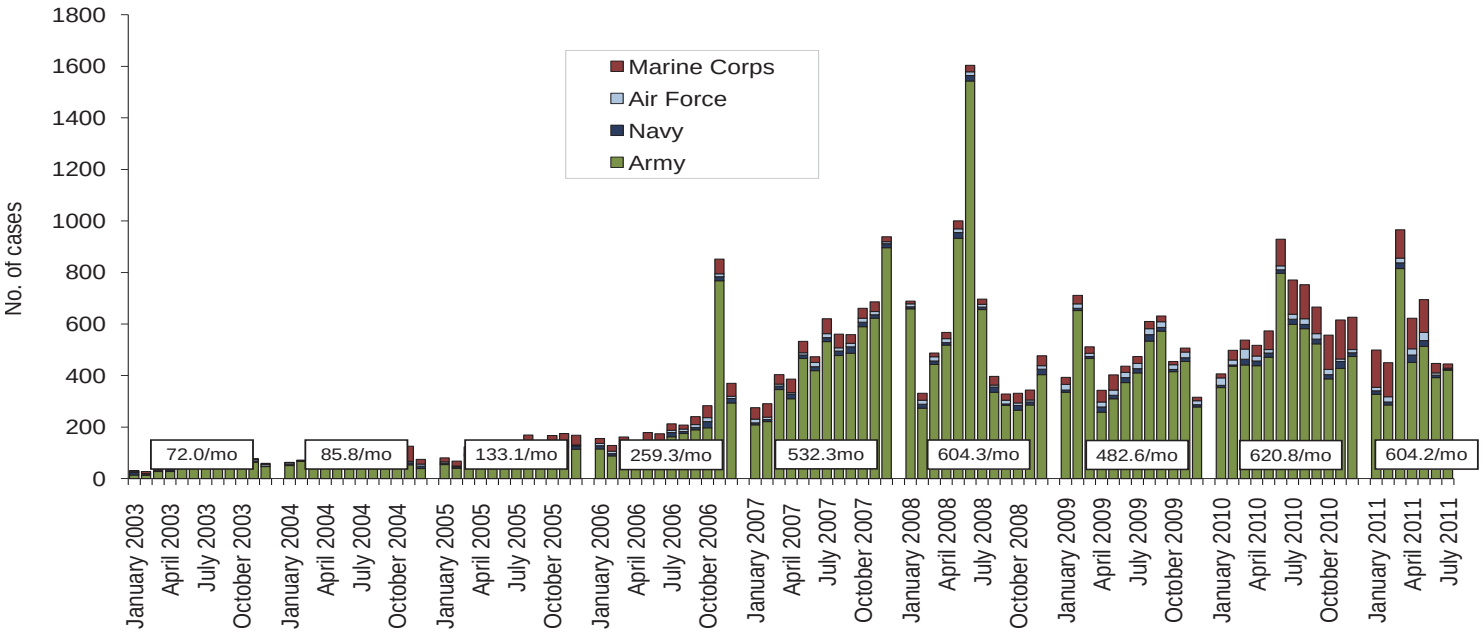
Motor vehicle accident-related deaths (outside of the operational theater) (per the DoD Medical Mortality Registry)



Reference: Armed Forces Health Surveillance Center. Motor vehicle-related deaths, U.S. Armed Forces, 2010. *Medical Surveillance Monthly Report (MSMR)*. Mar 11;17(3):2-6.
Note: Death while deployed to/within 90 days of returning from OEF/OIF/OND. Excludes accidents involving military-owned/special use motor vehicles. Excludes individuals medically evacuated from CENTCOM and/or hospitalized in Landstuhl, Germany within 10 days prior to death.

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 -July 2011 (data as of 26 August 2011)

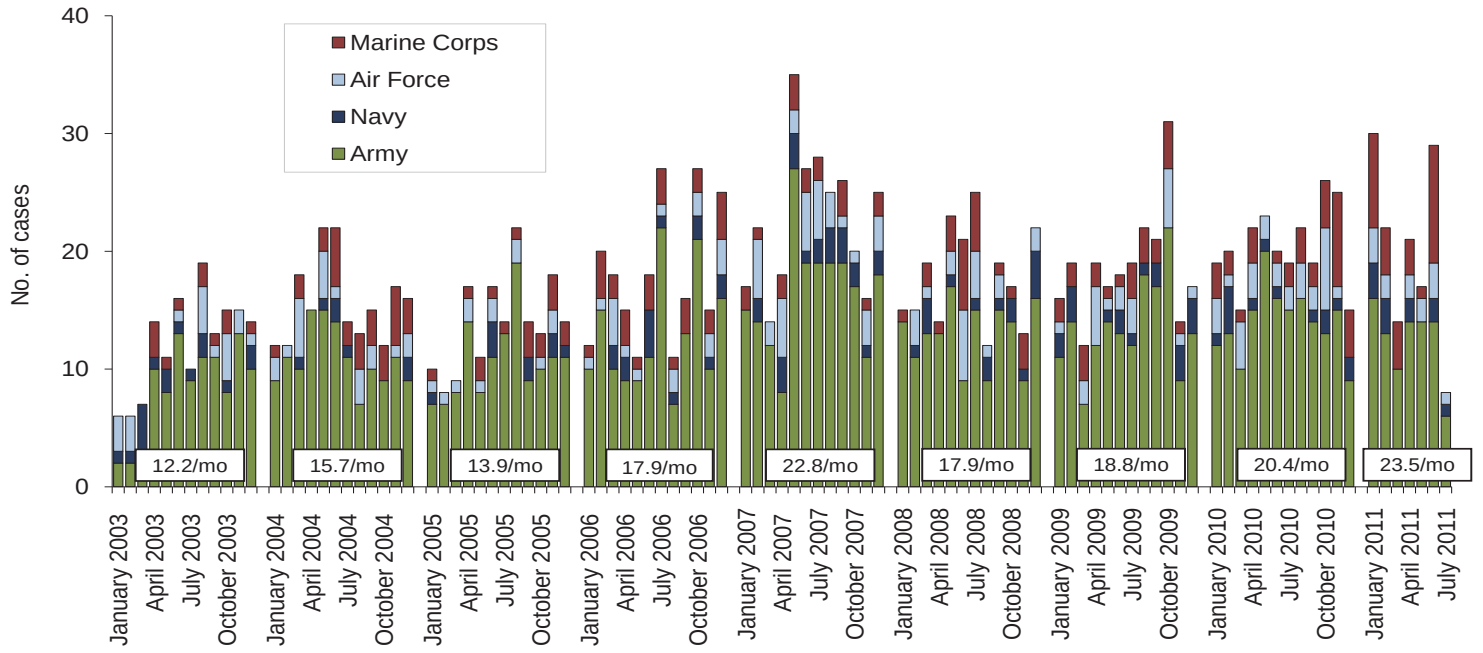
Traumatic brain injury (ICD-9: 310.2, 800-801, 803-804, 850-854, 907.0, 950.1-950.3, 959.01, V15.5_1-9, V15.5_A-F, V15.52_0-9, V15.52_A-F, V15.59_1-9, V15.59_A-F)[a]



Reference: Armed Forces Health Surveillance Center. Deriving case counts from medical encounter data: considerations when interpreting health surveillance reports. *MSMR*. Dec 2009; 16(12):2-8.

[a]Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit while deployed to/within 30 days of returning from OEF/OIF. (Includes in-theater medical encounters from the Theater Medical Data Store [TMDS] and excludes 3,084 deployers who had at least one TBI-related medical encounter any time prior to OEF/OIF).

Deep vein thrombophlebitis/pulmonary embolus (ICD-9: 415.1, 451.1, 451.81, 451.83, 451.89, 453.2, 453.40 - 453.42 and 453.8)[b]

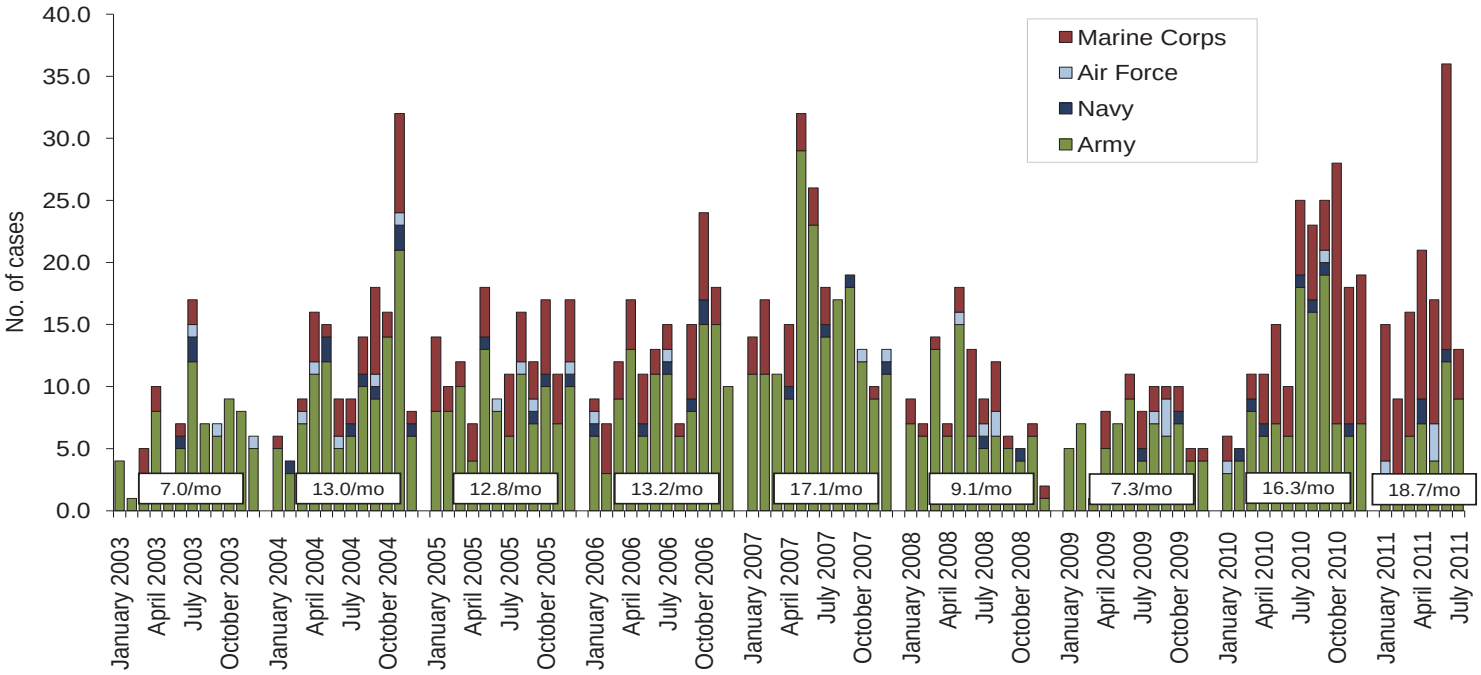


Reference: Isenbarger DW, Atwood JE, Scott PT, et al. Venous thromboembolism among United States soldiers deployed to Southwest Asia. *Thromb Res*. 2006;117(4):379-83.

[b]One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 90 days of returning from OEF/OIF.

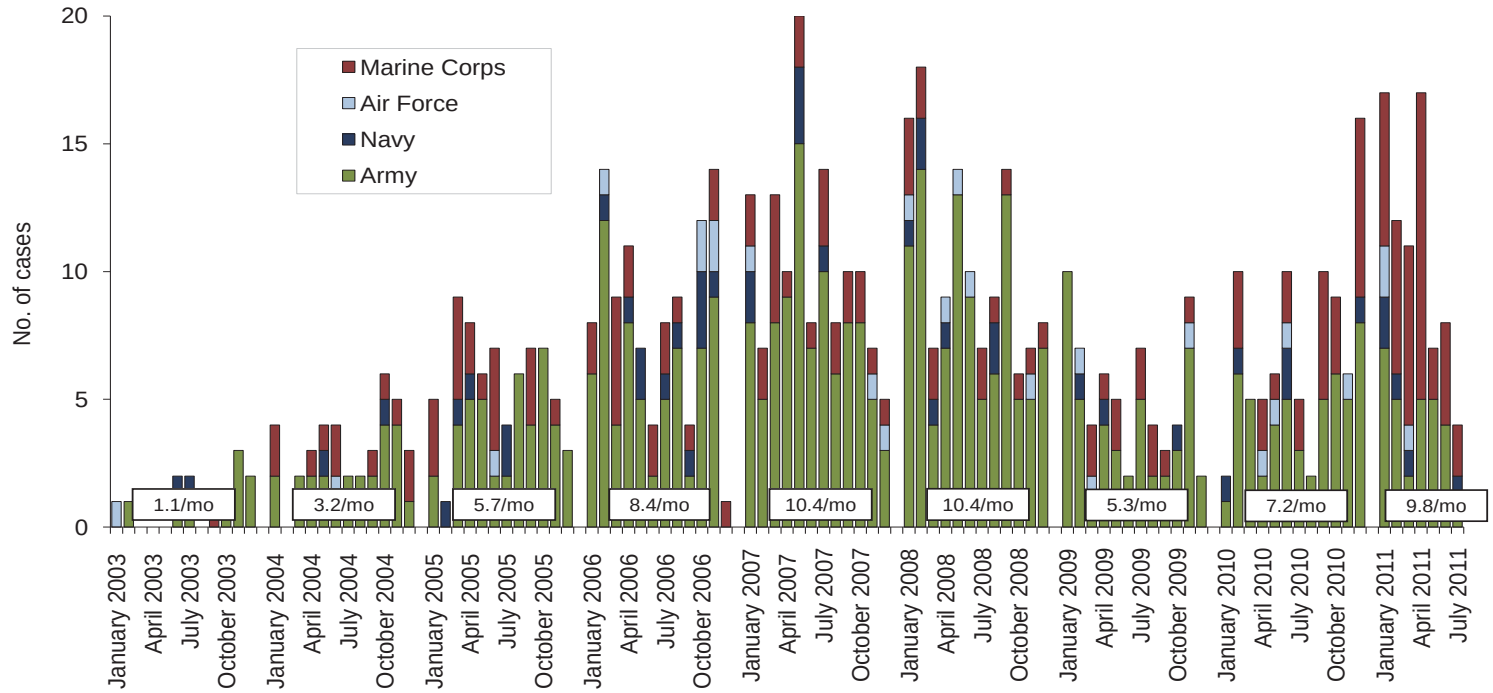
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - July 2011 (data as of 25 August 2011)

Amputations (ICD-9-CM: 887, 896, 897, V49.6 except V49.61-V49.62, V49.7 except V49.71-V49.72, PR 84.0-PR 84.1, except PR 84.01-PR 84.02 and PR 84.11)[a]



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: amputations. Amputations of lower and upper extremities, U.S. Armed Forces, 1990-2004. *MSMR*. Jan 2005;11(1):2-6.
[a]Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 365 days of returning from OEF/OIF.

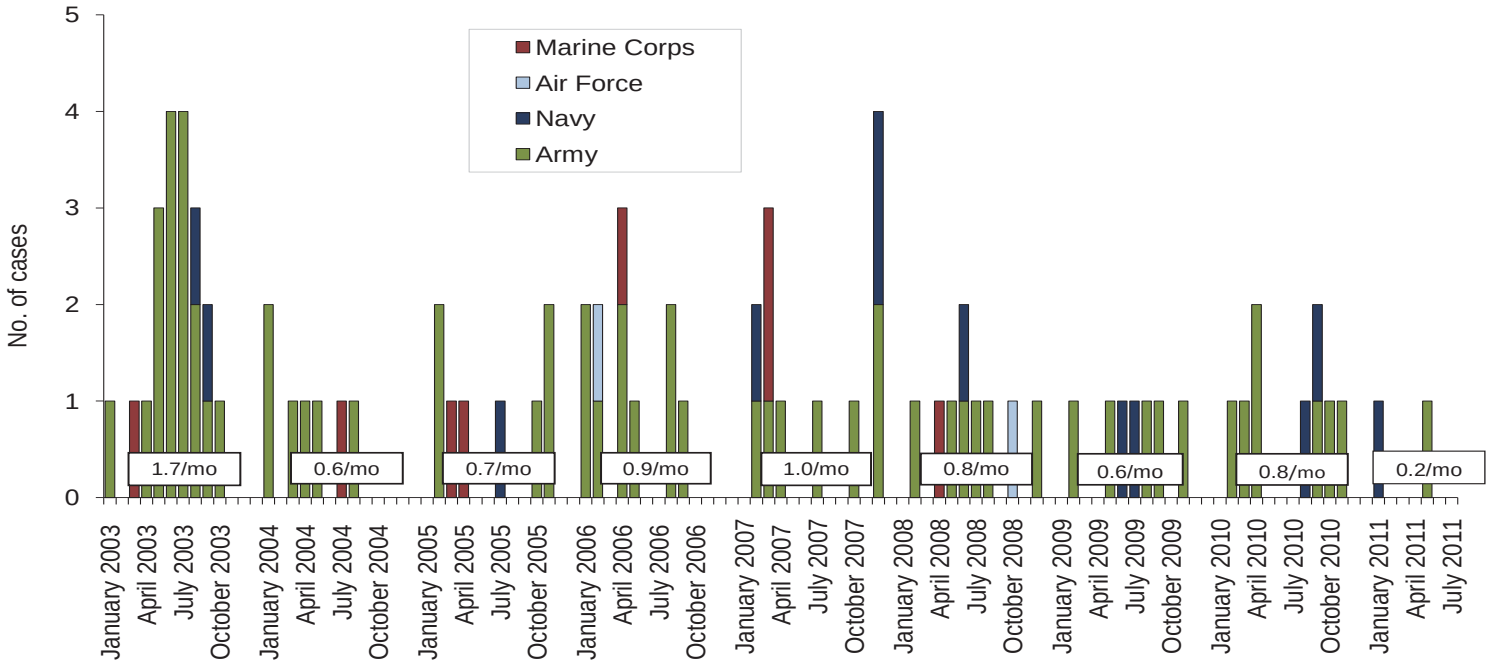
Heterotopic ossification (ICD-9: 728.12, 728.13, 728.19)[b]



Reference: Army Medical Surveillance Activity. Heterotopic ossification, active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):7-9.
[b]One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 365 days of returning from OEF/OIF.

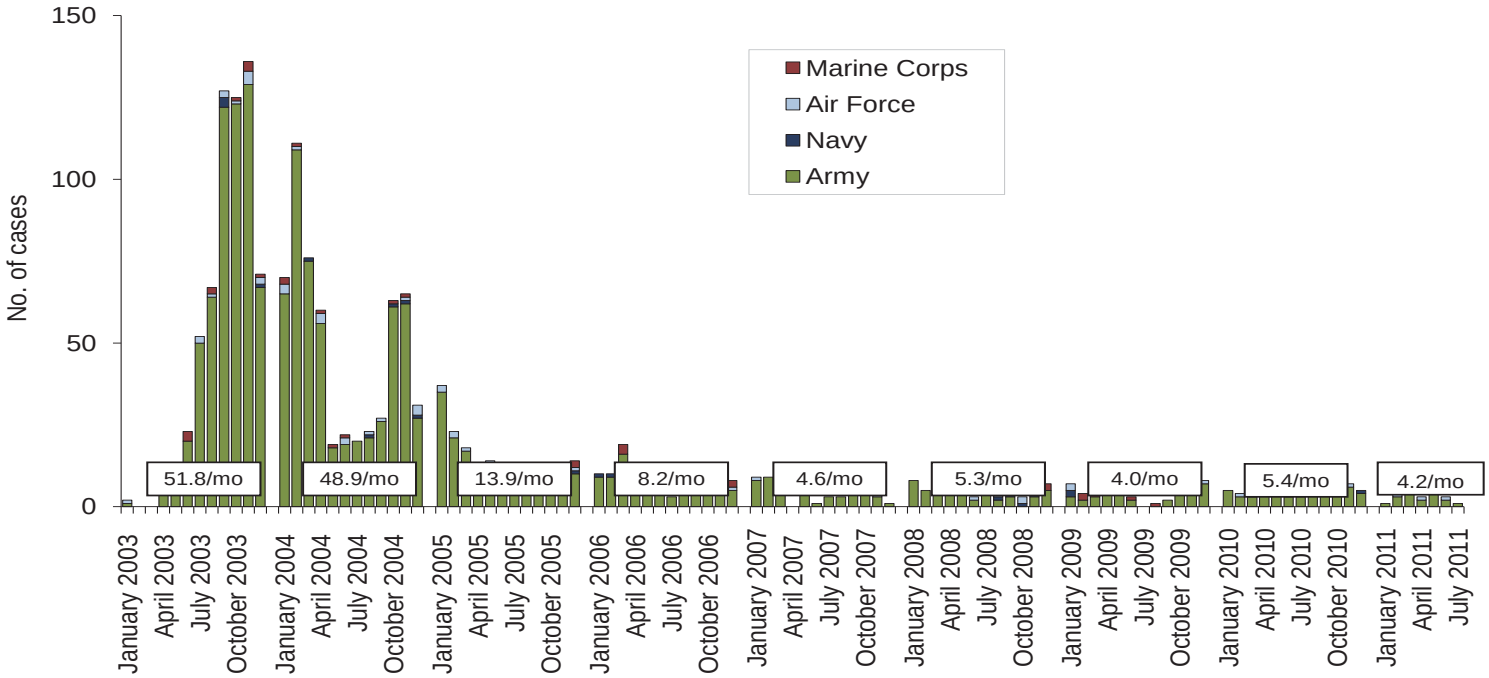
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 -July 2011 (data as of 26 August 2011)

Severe acute pneumonia (ICD-9: 518.81, 518.82, 480-487, 786.09)[a]



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: severe acute pneumonia. Hospitalizations for acute respiratory failure (ARF)/acute respiratory distress syndrome (ARDS) among participants in Operation Enduring Freedom/Operation Iraqi Freedom, active components, U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):6-7.
[a]Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 days of returning from OEF/OIF.

Leishmaniasis (ICD-9: 085.0 to 085.9)[b]



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: leishmaniasis. Leishmaniasis among U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):2-4.
[b]Indicator diagnosis (one per individual) during a hospitalization, ambulatory visit, and/or from a notifiable medical event during/after service in OEF/OIF.

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